BULLETIN OF THE

TAYLOR SOCIETY

AN INTERNATIONAL SOCIETY TO PROMOTE THE SCIENCE
AND THE ART OF ADMINISTRATION AND OF MANAGEMENT

Contributions by
W. V. Bingham, Henri Le Chatelier, J. E. Ogara, H. S. Person, Ben M. Selekman, F. W. Taylor
on
Historical, Psychological and Practical Factors Underlying Present Day Industrial Management Problems

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The objects of this Society are, through research, discussion, publication and other appropriate means:

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2. To secure the gradual elimination of unnecessary effort and of unduly burdensome toil in the accomplishment of the work of the world.

3. To promote the scientific study and teaching of the principles governing organized effort, and of the mechanisms of their adaptations and application under varying and changing conditions.

4. To promote general recognition of the fact that the evaluation and application of these principles and mechanisms are the mutual concern of the community, the worker, the manager and the employer.

5. To inspire in labor, manager and employer a constant adherence to the highest ethical conception of their individual and collective responsibility.

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Annual Meeting
of the Taylor Society

December 5-7, 1928

Rumford Hall, 50 East 41st Street

Afternoon and dinner sessions are being held on the fifth; morning, afternoon and evening sessions on the sixth and seventh. The Teachers of Management will meet on Saturday morning and afternoon in the Engineering Building.

Hold these dates—detailed announcement to follow.

Comment

EVERY executive who gives thought to industrial relations will find much of interest in Mr. Selekman's report of his studies in Great Britain and Germany. The trend which Mr. Selekman observed in Great Britain is an increasing consciousness of the importance of applying scientific methods to the conduct of industry, and a disposition of the working groups to bring pressure to bear for better management in industry. Institutions which were developed originally for the settlement of group differences are being transformed into joint fact finding bodies engaged in improvement of industrial conditions. That the trend is becoming a policy of labor is indicated by such recent events as the Swansea vote to participate in the Mond conference.

IN GERMANY, more accustomed to central control, the individual is more readily adjusting to group discipline. Organized employers and organized workers are given status by law and both are enjoined to co-operate, not only in a determination of such things as wages and working conditions, but in the development of national productive power. And not only are there joint institutions for these purposes, but each employer group or union maintains its individual research service, or avails itself of such service, to equip itself for contribution to joint constructive effort.

THESE developments are compelled by economic necessity resulting from the war. The major problem is national stability; a condition of its solution is greater industrial efficiency; and one move toward satisfying the condition is to give responsibility to functional industrial groups. In the United States there is not the same problem: here is national stability and extraordinary overall industrial efficiency, the result of advantages in natural facilities and markets, combined with enough participation in the war to stimulate development of a new and highly efficient industrial technique. But the *rate* of development on to a new plane of *general* prosperity in the United States has brought distress to many industries and to many individual plants; and has introduced a new and serious type of "technological unemployment." It may well be that the experiments in Great Britain and Germany have much of value for the United States.

Recent Trends in Industrial Relations in Great Britain and Germany[1]

Observations Based on a Year's Study in Europe[2]

By **BEN M. SELEKMAN**

I AM GLAD to have this opportunity to report my observations on industrial relations in Great Britain and Germany to members of the Taylor Society. Recent developments have been introducing changes of great significance there that should be especially interesting to this group, primarily concerned as you are with problems and methods of management. If I were to characterize in one sentence the outstanding trend of industry in these countries today I would point to the increasing consciousness among all parties of the importance of applying scientific methods to the conduct of industry. In fact, the word one hears perhaps more than any other, especially in Germany, in discussing industrial problems is "rationalization." However we in America may quarrel with that term, to them it means the application of the art and science of management not only to one particular plant but to the organization of an entire industry on both its productive and distributive sides. What makes the whole development most interesting and significant, particularly in England, is the fact that it is the labor group that is today exerting pressure on those in control of industry for increased efficiency. This becomes the more remarkable when we recall that the labor movement there as in Germany is dominantly socialistic in philosophy. But the force of events is fast consumating an alliance between Karl Marx and Frederick W. Taylor; and although the theory of "Taylorism" still meets denunciations among labor men, its practice is rapidly gaining their advocacy.

I must hasten to emphasize that this whole development is only a trend, a tendency, that is just barely emerging. However, it has already begun to exert its influence. Its final outcome depends on a number of factors, particularly upon how employers utilize the opportunity before them. Its expression has necessarily varied with the different conditions prevailing in each of these countries. The best procedure, therefore, will be to discuss them separately. For industrial relations in Great Britain, like almost every other major activity, is still dominated by a philosophy of decentralization and strong individualism. In Germany, on the other hand, everything is centralized and organized as far as possible, with the individual readily submitting himself to group disciplines.

Let us turn, then, to Great Britain. The growing insistence upon the efficient conduct of industry is producing there several important changes in industrial thinking and practice. For one thing the trade union movement appears to be revaluating its fundamental philosophy. It seems to be relegating to the background Marxian formulae and substituting for them programs based upon economic facts. With the minimizing of the class struggle as a directing concept for action, labor leaders are growing more and more conscious of wastes involved in the use of the strike weapon to achieve gains for wage earners. Two logical consequences follow: In the first place, ways are being sought for extending the joint machinery until now restricted largely to the consideration of wages, hours and working conditions to include factors affecting the welfare of industry as a whole, with the emphasis upon the substitution of co-operation for conflict. In the second place, an increasing emphasis is being placed upon research, fact finding and conference as means of obtaining the facts necessary for action.

Indeed, the American observer looking into labor relations in Britain is in for a sharp surprise. For the complexion of human relations in industry has changed markedly since the general strike of 1926. There has been a definite turning away from conflict, at least for the time being, toward an attempt to attain some constructive understanding between employers and employes throughout the whole of Great Britain.

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[1] Paper presented before the New York Metropolitan Section of the Taylor Society, May 17, 1928.

[2] The complete findings of this study are to be published this winter by Harper & Brothers.

But in fact the picture never was really as dark as it came to us. Newspapers report only huge, dramatic conflicts. Everyday, peaceful negotiations of differences do not, unfortunately, make good copy. Reports of the turbulence in coal mining with its two prolonged stoppages since the war, its two national inquiries, its continued bitterness and unrest, the fulminations of A. J. Cook, the miners' leader, and finally the General Strike of 1926 gave us over here the impression that Britain was in constant turmoil and on the brink of a revolution.

Nothing could have been further from the truth. Peaceful negotiation rather than large scale conflicts mark the conduct of industrial relations in Great Britain. The great iron and steel industry has not suffered a major stoppage in more than thirty years. The cotton industry has been free from large scale strikes and lockouts since the war. The metal trades have seen only one large scale conflict since the war—in 1922 when the employers locked out the workers. And so on down the line.

Only coal has been marked by chronic turbulency. It has been responsible for some three-fifths of all the time lost through strikes and lockouts since the war as well as during the twenty years preceding it. Even the General Strike itself had its origin in a coal dispute. But we in America are familiar with the extent to which underlying economic factors make for unrest in coal. In Great Britain the industry suffers from inefficient management, excess capacity, unusually small freight cars, comparatively slight development of by-product utilization, duplication in retail agencies, inadequate research, and on top of all this, sharp competition in world markets from Germany, Belgium, Poland and France.

Indeed the wonder is not that coal has been so turbulent but that the other industries in Britain have been relatively so free from stoppages. For during the past seven years British industry has labored under the handicap of an economic depression more severe and more protracted than any known in her previous industrial history. It is a depression which strikes at the very roots of her economic life. For it affects in the main the huge export industries upon which her industrial supremacy has been built. For seven years coal mining, iron and steel, metal trades, shipbuilding, and textiles have been unable to free themselves from the heavy burdens of unemployment and stagnation with which the war left them. During all these years the total number of unemployed has never, with the exception of a few scattered weeks, dropped below one million.

These conditions have naturally produced deep seated unrest among the masses of the workers who had looked forward to a new and better day after the Great War. It explains in a measure the readiness with which they walked out in sympathy with the locked-out miners in the General Strike of 1926. For here was presented for the first time an opportunity to voice on a large scale their protest against the manner and direction in which industry appeared to be drifting.

That this discontent did not break out into more frequent strikes and upheavals is no doubt due in a large measure to the operation of long established machinery for the conduct of industrial relations. For over three decades in most industries, and in some for a much longer period, relations between employers and employes in Great Britain have in the main been governed by orderly methods formulated in trade agreements. At present these agreements are generally national in character, that is, each one covers an industry as a whole. They are negotiated by the trade unions and employers' associations concerned. Organization of both sides, of employers and employes, indeed, has been the foundation upon which the structure of British relationships in industry has been built.

Hardly an important industry exists that does not have some formal method for negotiation and the adjustment of grievances. This machinery provides generally for a hierarchy of joint courts to which all disputes must be brought. It has on the whole worked well. For every breakdown of which newspapers tell us literally thousands of disputes are amicably handled and adjusted.

But the sponsors of the new developments in industrial relations are convinced that the time has come to enlarge this record, fine as it is within its limits, and to turn the historic machinery of collective bargaining, beyond the negotiation of wages, hours and conditions, to the consideration of those larger factors affecting industry as a whole. I have said that this trend emerged as a definite thing after the general strike. But it is in a sense the result of historical development, for attempts have been made in the past to broaden the scope and function of joint machinery to include broad questions concerning the welfare of industry. These efforts are represented by: (1) the joint industrial councils or Whitley Councils, as we term them in this country; (2) works councils or shop committees functioning in individual establishments; (3) co-operative schemes undertaken in certain industries to further their efficiency and prosperity; (4) joint fact finding and (5) the increasing acceptance of piece work and technical improvements by British unions.

Perhaps the most important of the precursors of the present move toward better labor relations have been the joint industrial councils. At present forty-seven Joint Industrial Councils exist in Britain, covering industries employing in the neighborhood of three million persons. They are found in such important trades as wool textiles, pottery, Welsh plate and sheet, hosiery, printing, heavy chemicals, flour milling, the docks, government employment and various public utility services.

A joint industrial council presupposes effective organization on both sides, and consists of equal representatives from the employers' associations and the trade unions concerned. Usually they serve as negotiating bodies for their industries, draft national agreements and determine local differentials. They are also courts for the settlement of grievances. But beyond these usual duties, they are charged with the responsibility of co-operating to promote the welfare of industry as a whole.

Now many people in Britain are dissatisfied with the results achieved by these councils. The councils, they say, have in practice been little more than negotiating machinery for the settlement of wages, hours and working conditions; and few, if any, have pursued their broader objectives of promoting "the progress and well-being of the trade."

Opinions of this type undoubtedly arise from memories of the high idealism with which the councils were created. Formulated in the midst of the war period, they were hailed as one instrument of that "new world" for which men everywhere were seeking. But confronted from the beginning with grave problems of demobilization and transition to peace time industry, and overwhelmed by the depression and disillusion of the post-war years, the reality of the councils has thus far proved very different from the eager hopes with which they were launched. To an American observer, however, viewing the councils from the perspective of practices in the United States, they appear a significant advance in industrial relations.

The great advantage in joint industrial councils over old types of joint relations machinery is that they meet not only when difficulties have already arisen or a new agreement must be negotiated, but regularly, whether it be monthly, quarterly, or within some other period. Thus they really constitute parliaments for the various industries. Frequent and regular meetings result in better acquaintance among representatives of both sides. Out of this greater familiarity grows a realization on each side that the men on the other are also people of integrity. Before a Council has operated a very long time, discussion generally assumes a calmer tone. Regular meetings, again, enable Councils to deal with difficulties in their early stage. Indeed, continuous contact helps eliminate many of the delays that often vex usual industrial negotiation and makes possible a more sensitive realization of changes in opinion. Consequently the Councils have frequently been able to prevent the crystallization of grievances which otherwise might have assumed formidable and dangerous proportions.

It is true that the vast majority of Councils have thus far made the regular consideration of wages, hours and working conditions their most important activity. But even here they have accomplished significant things—the standardization of wages, reductions of hours, institutions of vacation schemes, improvement of factory conditions, promotion of health, welfare and safety schemes. But the Councils have also brought within the compass of collective dealing many matters that were hitherto excluded. Thus councils now engage in the furtherance of fact finding, welfare and legislation. Certainly much still remains to be done toward the full realization of larger objectives; but that at least beginnings have been made can hardly be doubted. Increasingly it is being recognized in Britain now that the joint councils offer a promising basis for furthering the new type of collective relations which is so much to the fore in present discussions of ways out of the protracted economic stagnation in the export trades.

Works councils have also played their part in leading to the present emphasis on co-operation and efficiency. On the whole the shop committee movement has not so far become widespread in Britain. Neither employers nor trade union officials appear generally to have given serious consideration to the importance of this type of employes' representation. However, a number of progressive and pioneering employers in Britain have succeeded in launching works committees which are functioning successfully. In practically every case these councils operate with the full co-operation of the unions concerned. Company unions in the American sense are, with few scattered exceptions, nonexistent in Britain.

In general the plants possessing successful works councils stand among the most progressive and efficient firms in Britain. Just as we in the United States possess our "show places" to which all industrial investigators from Europe point—Dennison's, Filene's, Hart, Schaffner and Marx, Dutchess Bleachery, etc.—so Britain, too, has her pioneering employers. I could not help but be impressed with the fine organization, progressive spirit, and good will to be found in such plants as the repair shops of the London General Omnibus Company, Cadbury's, Metropolitan Vickers', Hans Renold's, Mather and Platt's, and Rowntree's Chocolate and Cocoa Works. Works committees have on the whole been a real help in bringing about a healthy spirit of co-operation in these companies.

Efforts here and there to tackle jointly problems of industry have also played a large role. During the summer of 1927, for instance, the London, Midland and Scottish Railway and the National Union of Railwaymen launched a program of co-operation between management and men analogous in principle to the Baltimore and Ohio plan in this country. It was devised to help meet the serious competition of motor transport. By eliminating waste, by reducing pilferage, by rendering better service to the travelling public, it was hoped to hold the business which motor buses were gradually taking away from the railroads. The union co-operated whole-heartedly. Similarly in the ports of England, the Transport Workers' Union and employers have been discussing and working out programs for the decasualization of dock labor as well as for making it efficient. Again, in 1925 the Transport Workers' Union co-operated with the London General Omnibus Company in a picturesque war of propaganda and legislation against the "pirate buses" which small owners had sent in alarming number into the streets of London. Various joint industrial councils—the potteries, printing, tramways, boot and shoe and others—have given attention to such matters as cost accounting, factory organization and employe training.

It was inevitable that such a long development of joint machinery and relationships should have gradually brought both sides to a realization of the importance of facts as a basis for negotiation and discussion. The new trend toward co-operative concern with problems of industry has given it added impetus. The instances of joint fact finding and joint research make an interesting index of what has been quietly taking place in this realm. The use of sliding scales as a basis of wage setting is a notable example. Thus for decades the iron and steel trades have hired joint accountants to determine the selling price of products, which determines wage rates. Altogether eighty sliding scales based on fluctuation in the cost of living are in existence. In the cotton industry the application of standard wage rates to specific cases is so complex a matter that both sides choose officials according to their knowledge of the technical issues involved.

Joint industrial councils have launched several significant essays in joint research and fact finding. Ten councils have experimented with the possibility of deciding questions of wages and conditions by jointly determined fact rather than by mere tug-of-war. Joint inquiries have been made into broad questions such as welfare, education, factory design, costing systems, sanitation and safety, and the state of the industry. The council for the pottery industry has appointed two special committees for purposes of research. The first, known as the Research, Inventions and Designs Committee, has devoted itself to investigating questions of safety, sanitation, education, processes and inventions. The second committee, the "Statistical and Enquiries Committee," has devoted itself to the collection of industrial statistics—wages, costs, costing systems and so forth—and to related inquiries into industrial problems. Important joint research has been carried on by the Printing Council on matters of workers' health and safety.

Finally, beginnings have been made toward instituting joint inquiries and investigations into the factors underlying the present depression and the most promising means for emerging from under it. In March, 1925 the Shipbuilding Employers' Federation and the Shipyard Trade Unions instituted a joint inquiry into foreign competition and conditions in the depressed shipbuilding industry. After the appointment of joint committees, the collection of pertinent data and the holding of twenty-two meetings conclusions and recommendations were agreed upon. They included several recommendations for government action, summaries of facts on wages and prices, the encouragement of piece work and the introduction of labor saving devices, reforms in the demarcation of work, and improved time keeping. Certain of these recommendations have been receiving practical application in the industry.

It was inevitable, too, that the long development of the newer types of joint relations machinery should bring with it gradual changes of attitudes. It is too generally taken for granted, for instance, that British workmen still retain their early objections to piece work and the introduction of technical improvements. The truth appears quite otherwise. Payment by results is steadily increasing; and at times the representatives of the unions themselves press for its extension. They all insist, of course, that the workers should be safeguarded against abuses with which their past experience had familiarized them—speeding up, reductions in the rates when earnings increase, and arbitrary determination of standards. In the same way some of the most powerful unions today are actively urging the adoption of technical improvements, again of course with jointly agreed safeguards for the workers. Employers in Britain repeatedly told me that they have no difficulty in introducing improvements of any kind provided they negotiate beforehand with the unions concerned.

But this evolution in labor's attitude toward industrial efficiency has been a gradual, unplanned process. What differentiates the new tendency emerging since 1926 from the quiet undercurrents of the years before is the manner in which emphasis on efficient management, and co-operation, are becoming the articulate program of many leaders on both sides. They seek today to gather up all the historic machinery and methods that had been developed during the past and turn them to the new service of constructive co-operation for the increase of production and the welfare of the nation. Where formerly collective dealings between employers and employed were concentrated upon the problems of dividing the proceeds of industry, today attention is being directed to possibilities of increasing the product to be divided.

The continued impotence of the old methods against the prolonged economic depression is of course giving substance and direction to the new tendency. We in the United States with our huge, protected home market find it difficult to grasp the strains and stresses of the seven years through which British industry has had to pass since 1921. Through a variety of causes the "workshop of the world" suddenly found the bottom dropped out of her chief export industries—cotton, coal, iron and steel, machine manufacture, shipbuilding—about which her entire economic life had centered in the past. The results offer a mixed picture of long stagnant export industries and prosperous home trades, the wane of old industrial areas and the rise of new ones, a continuing million unemployed and an increased standard of living among certain groups—all indices of fundamental shift and transformation.

In a sense it was but natural that the British people should refuse at first to accept these signs as indicating the need for new adjustments and a radical reconstruction of traditional methods. For years they hoped that lost markets would be regained, that former good times would return if only they waited and let things take their usual course. Under the circumstances, indeed, it is evidence of the stability of British industrial relations that this period saw so little upheaval. Yet although important industries passed through it without a major stoppage, although England called its industrial conferences, launched its inquiries, tried new methods here and there, the attitude of both sides up until 1926 was in the main a fighting one. Employers pressed for wage reductions, changes in working conditions, reduced labor costs, and backed their demands with threatened and actual lockouts. The unions accepted the logic of the times sullenly and watched doggedly for chances to recoup their losses. With the miners as the spearhead of the movement, their economic strategy was supplemented by broad programs of nationalization, reliance on political action, and vague demands for some ultimate control by the workers engaged in the various industries.

The ending of the General Strike, as I said, marks the turning point. Labor began to take stock of its old philosophy. Accepting the signs that told them plainly that capitalism was not slated for an immediate collapse, that instead it was showing everywhere evidence of vigorous recovery from the post-war chaos, the unions definitely prepared to try new methods. They began to do more intensive research; they looked into American experience. The result has appeared in the announcement of what may be considered a really new policy for the British trade union movement at the annual convention of the Trade Union Congress in Edinburgh in September, 1927. The President of the Congress, Mr. George Hicks, set the keynote of the new policy in his opening address when he said: ". . . . I would say that we are just at the beginning of the constructive period of Trade Unionism . . . . Much fuller use can be made of the machinery for joint consultation and negotiation between employers and employed . . . . A direct exchange of practical views between representatives of the great organized bodies who have responsibility for the conduct of industry and know its problems at first hand . . . . would bring both sides face to face with the hard realities of the present economic situation, and might yield useful results in showing how far and upon what terms co-operation is possible in a common endeavor to improve the efficiency of industry and to raise the workers' standard of life."

The Congress officially accepted this proposal. Now this in many ways is a remarkable change of front. For labor was on the whole in an angry and resentful mood because of the Trade Disputes and Trade Unions Act which had been passed within the year. This act, you will recall, deprives British unions of many liberties they had enjoyed since 1906. It makes illegal large scale sympathetic strikes, curtails picketing, prohibits government employes from affiliating with the Trade Union Congress, makes possible the use of the injunction in labor disputes, and threatens seriously to cut down the financial resources of the Labor Party. In resentment against this act the unions had refused to co-operate on several industrial proposals; the Edinburgh Convention itself had rejected Premier Baldwin's overtures for industrial peace. But within industry itself, and through their long established machinery of industrial relations, they expressed their willingness to co-operate in promoting efficiency to help Britain out of its economic crisis and to increase the workers' standard of life.

The first outcome of these overtures by labor is perhaps known to most of you. The official employers' association, corresponding to the Trade Union Congress—The National Confederation of Employers' Organizations—refused to meet for the proposed discussions. They took the position that whatever might be done to improve labor relations had to be done within the individual industries themselves. But Sir Alfred Mond (now Lord Melchett), who has increasingly assumed the leadership of progressive employers in England, succeeded in gathering a group who were willing to confer with labor leaders on "how to increase efficiency and improve the workers' conditions." Both employers and workers have suggested subjects for joint inquiry at the first meetings held. They included, among others, such issues as "Rationalization and Amalgamation," "Security and Status of the Workers," "Works Councils," "High Wages Policy," "Management and Labor," "Participation of Labor in the Effects of Increased Production," and "Publicity for the Facts of Industry." Subcommittees have been appointed to consider the agenda, the first meetings of which were held on March 21. Regular joint weekly meetings have been arranged.

Of course nothing revolutionary will come of these conferences. In a sense it is true that every industry must work out its own methods. Yet undoubtedly these conferences will clear the air of suspicion and may result in the adoption of guiding principles and methods to be used in specific industries. Discussion has arisen over the possibility of creating a permanent "Industrial Parliament" to carry on continuously the type of activity undertaken by these conferences. But whatever their concrete outcome, they symbolize the remarkable change that since 1926 has been carrying industrial relations away from their old, traditional war footing.

Let us turn now to Germany. While Britain today is just discussing methods of reorganizing industry to increase its efficiency, Germany has already made rapid strides with a program of extensive rationalization. In Britain the labor group is urging improved methods upon employers who are often reluctant to undertake the fundamental reorganization that may be necessary; in Germany the employers took the initiative and the unions accepted the program for greater and cheaper production. What German labor is anxious to do now is to make sure that the gains accruing from rationalization will be spread over the entire community. For it is important to remember that in Germany, as in England, the advocacy of scientific management on the part of the unions does not proceed from any purely intellectual or spiritual conversion. It is dominantly a bread and butter proposition for them. After the war, Germany, a defeated nation, faced the problem of somehow restoring her shattered industry and giving her workers employment and subsistence. She (as England, also, from somewhat different causes) has been searching eagerly for ways toward industrial stability, for means of holding her own in world markets. The search has shown that persistent industrial warfare may be an impediment to a nation. The prolonged coal stoppage in 1926 in Britain, for instance, gave Germany a chance (which she utilized) to capture British markets. In addition, of course, stories of American prosperity have had an important influence—stories of how scientific management, mass production and the so-called high wage policy of employers have made us, as they think, a fabulously rich people.

But when the parties to industry in Germany approached the problem of gearing this new concern with industrial efficiency into the whole pattern of industrial relations, they were, of course, conditioned by a historic background and mode of thought quite different from Britain's. In Britain, as we have just seen, it is a question of turning long established joint machinery through voluntary action to new purposes; of articulating into a definite program scattered experiments with co-operation that have been developing over years. In Germany the experiment wears an entirely different aspect. There we have an attempt—and for the first time in history—to formulate through a national constitution (the Weimar Constitution of 1919) and through law, a centralized, systematic, completely new scheme for an economic democracy. The issues before the parties to industry have been thus not how to turn old machinery to new purposes, but how to fit new purposes written into the law of the land to the industrial realities of the day.

Organizations of employers and of workers, and collective agreements are recognized. Both sides are granted equal rights before the law. The collective contract takes precedence over the individual contract. And especially interesting from the viewpoint of our present discussion, organizations of employers and employed are enjoined in the constitution to that two-fold aim which is now also being sought through voluntary development in the United States and Great Britain: joint determination of wages and working conditions, and co-operation in the development of the productive forces.

Industrial relations are now conducted within this framework; a series of laws gives them their concrete form.. Thus trade agreements are negotiated either for an industry as a whole or for large, self-sufficient industrial units by the employer, or organizations of employers, and the organizations of workers involved. They may be made applicable to the industry as a whole. But they lay down only broad general standards. The details of methods of payment, arrangement of working time, conditions of work, are formulated in the Works Rules (Arbeits Ordung). But even this function is not left to the employer and the individual employe. It is the management and the works council which, as we shall see, are jointly charged with the responsibility, among other things, of framing the Works Rules upon the basis of the trade agreement.

Disputes arising in this process of negotiation and interpreting the agreed terms are also settled according to provisions written into the law of the land. Grievances arising in the application of the trade contract and the works regulations, if not settled by the management and the men, must be carried before the special labor courts. The system contains a three-fold hierarchy of appeals courts, ranging from the local labor courts to the state labor courts and the national labor court. Joint representation of workers and employers exists in all, with impartial chairmen drawn from the legal profession.

As for the conciliation and arbitration of industrial disputes, Germany has instituted a most interesting experiment with a modified form of compulsory arbitration. It stands in sharp contrast to the insistence of Great Britain upon no intervention from the state except when desired by the parties concerned—and even then only in a voluntary form. According to the German system of conciliation, a proposition from the conciliators may be made binding upon the industry under stated conditions. The theory underlying it is somewhat as follows: Sometimes a show of force is essential; therefore not all stoppages but only unnecessary and socially wasteful ones must be avoided. Full discussion and agreement must be encouraged to the fullest extent possible. But the law requires first of all the recognition of collective agreements. Consequently it interestingly defines conciliation and arbitration (Schlictung) as an "aid to the negotiation of collective agreements." This aid is given through three agencies—joint conciliation committees, of which about a hundred are in existence; the Conciliators, of whom about twenty have been appointed, and at times especially appointed Conciliators. When negotiation fails a "Schiedspruch" or proposition—not a decision—is made by the Conciliators. It may be rejected or accepted by the parties. If accepted it becomes the collective agreement for the industry. If rejected by either or both sides it may be declared binding. Awards of Conciliation Committees may be declared binding by the Conciliators; those of the Conciliators by the Minister of Labor.

The formulation of this pattern of industrial relations after the war forced upon leaders of industry a sudden and wholesale change in labor policy as compared with pre-war practices. For the prevailing relation between labor and employers before the war in Germany was one of open and persistent hostility. None of the basic industries recognized or dealt with the unions; the large employers' associations fought their every attempt at entry. Trade agreements were negotiated between organizations on both sides only in the smaller, nonessential industries. During the war trade unions were given more recognition and status in Germany as in all industrial countries. With the ending of the war, German employers were called upon by law not only to deal with the unions whom they had generally fought, to negotiate agreements with them, to sit in joint economic councils with them, but also to admit them to some participation in management and production. It was a drastic transformation.

Ten years is a short period, so short that no final judgment can yet be even suggested on how this whole experiment is working. One can only report that on the whole it seems to be working comparatively well. Criticisms are urged at this point and that, changes are sought here and there, but it is generally held that the fundamentals of the new scheme have come to stay. Several factors have helped in smoothing the way of transition. For one thing such a centralized, systematic, organized scheme of industrial relations fits in with the general approach the Germans bring to all such activities. It squares with their philosophy of action, their "Weltanschauung," as they term it, so different from that current in individualistic, decentralized Britain. For another, the Germans of all classes are so anxious to help Germany make good, to recover her former world position under the great odds left by the war, that they are all willing to go to great lengths to prevent industrial strife.

With regard to the relations between this new pattern of collective dealings and the attempts to promote industial efficiency, three developments in particular may be noted. The first concerns the manner in which the works councils movement has thus far worked out in practice. The creation of a works council is compulsory in all plants employing twenty or more workers, if the employes demand it. When originally suggested in Germany, they were the storm centers of the post-war revolution, the spearhead of the Sparticist demand for a "Soviet" Germany to wrest power both from the capitalists and the unions. The Works Councils Law was a compromise devised to redirect this radical demand of the workers. It made the functions of the councils clearly subordinate to those of the unions. It gave them an independent existence; but in reality the trade unions have obtained control of them by "running" their candidates in the council elections.

The law accorded works councils two main and highly significant functions. First, they are charged with protecting the interests of the workers in the shop. Second, they are called upon to co-operate in the development of efficient production. But it is almost entirely the first aim which has thus far received practical application. Those councils which I personally investigated appeared to be discharging their functions under this head very well indeed. In some of the larger plants like Krupp's, the United Steel Works, the General Electric and Siemens', the president of the Works Council is maintained as a full time, paid official devoted solely to his council duties. The representatives of this type that I met impressed me as earnest, serious men, conscious of the responsibility devolving upon them. But of co-operation in production there is hardly a sign. It is generally felt that the workers are not ready for it, nor are the employers at all willing to experiment with it. The law may require representation of the council on boards of directors; but in reality they are usually mute members.

Confronted by this problem, the unions have adopted a policy that appears very long sighted. It is based upon a frank recognition that the workers are not yet ready for any widespread, effective participation in managmeent, and that before they can be ready they will have to be specially trained. Consequently courses of study have been prepared for works council members designed to acquaint them with the intricacies of business administration, finance and management. They are well attended and seriously pursued.

This acceptance of the necessity of training is closely related to a second characteristic of industrial relations in Germany, namely, the extent to which research and fact finding is used by both employers and trade unions. It is really striking. Hardly a union or an employers' organization exists but which either has its own research department or avails itself of the services of some research bureau. This aspect of administration is developed on a much larger scale in Germany than either in Britain or in this country.

I have spoken of the wide acceptance "Rationalization" has won from both employers and trade unions in Germany. It is undoubtedly one of the main elements that has helped Germany get her industrial wheels ahum once more. For while Britain still is unable to provide work for one million of her workers, Germany has reduced her unemployed from a peak of over 2,500,000 to some 500,000. But one gets the feeling that so far rationalization in Germany has meant a disproportionate emphasis on technical improvements with too little appreciation of the importance of the human factor. However, we must remember that the trade union movement is powerful and strongly intrenched both in industry and the state. It is biding its time. At present it is anxious to see industry stabilized and prosperous. It is constantly pressing for a larger share of the gains from rationalization, and, when in its opinion, the proper time has arrived, it will make an insistent demand for what it considers a just share to the workers.

This, then, is the most recent trend in industrial relations in Great Britain and in Germany—a mere tendency, perhaps, a promise of a new relationship in industry. Labor has expressed itself as willing to accept the scientific management and rationalization of industry, provided, of course, proper safeguards are assured the workers. In Great Britain this development has emerged as the most recent stage in a long development of collective dealings; in Germany it appears as a central scheme of industrial dealing and co-operation formulated in the fundamental law of the land. The promise is here. What its outcome will be depends in large measure upon the lead of the employing group. If employers accept this new proffer of co-operation, if they share with the workers all facts in the state of the industry, if they work out jointly with them measures for safeguarding even the immediate interests of the workers, if they put through necessary reorganizations rather than resort to wage reductions in times of stress—in a word, if they are willing to make scientific management a community process carried out by the parties to industry for the good of the community as a whole, there is really hope for a new kind of future. But if, on the other hand, they turn their backs on this new tendency or give it only a half trial, they must face the possibility that the leadership of labor may again fall into the hands of a militant group. For in both of these countries strong minorities exist which condemn the new policy of labor as "class collaboration." They will naturally seize on any failure of it as a means for wresting control of labor from those who now hold it. With such a turn of events, conflict rather than co-operation may again become the key in which human relations in industry will be set.

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Industrial Psychology[1]

Its Progress in the United States — Psychology as Science, as Point of View and as Method

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IN WHAT directions and to what extent has the science of psychology influenced industrial thought and practice in the United States? What influences have operated to bring industrial problems to the attention of psychologists, and to bring psychological doctrines to bear on the thinking and practice of business executives, industrial engineers, labor managers, trade union leaders, and students of social science whose primary interest centers in industrial relations? How keenly are the masters of American industry aware of the problems of individual and social psychology that have been brought into the spotlight of inquiry as a result of mass production and minute division of labor, with the resulting tendencies toward repetitive processes, shorter hours, better wages, modification of many skilled trades, demand for highly specialized, non-transferable skills, and decreased need of mere physical strength in the worker? What help have the practitioners of scientific management or the administrators of personnel policies received from the science of psychology?

No damage will be done through frank admission at the outset that the significant and constructive contributions of industrial psychology in America have been meagre. Psychology is a rapidly growing but still youthful science. It has been absorbed in the task of putting its own house in order. Within the past generation it has had to win the cooperation and respect of its elder sisters, the biological sciences. New techniques of research have had to be devised, new hypotheses formulated and put to the acid test of controlled experiment. Efforts in these directions have met with such success that there has been a wholly unprecedented and disproportionate demand for the services of psychologists as instructors in university and college courses in psychology. Then, too, the applications of psychology to problems of elementary and secondary education have absorbed a large share of the energies of the most brilliant of American psychologists. One need only mention the names of such leaders of psychological research as Thorndike, Terman, Judd, and G. Stanley Hall, to illustrate the fact that careers in educational psychology have attracted some of our ablest men. And today, if industry is to bring it to pass that the attention of eminent psychologists shall be focussed on the problems of human relations and conditions in factories and offices, it must be prepared to compete not only with the instructional budgets of the universities and the considerable financial rewards that accrue, through publication, to those who greatly improve techniques of public education; it must compete as well with enticing research opportunities now opening up to psychologists on problems arising in the fields of political science, law, criminology, child guidance and social betterment.

Not only have psychologists been under pressure to bend their efforts toward non-industrial problems; they have been content to see large areas of psychological inquiry in industry pre-empted by capable investigators whose training has been primarily other than that of the psychological laboratory. Many of the best contributions to the study of industrial fatigue, accidents, illumination, and simplification of work, have been made not by psychologists but by industrial engineers and specialists in scientific management. A canvass of the contributions of Frederick W. Taylor and his associates, for example, reveals numerous studies in the subject matter of industrial psychology. Hence an unwarranted tradition has prevailed, to the effect that questions of time and motion study, incentives, factory training, and the design of tools, machines, benches and chairs to fit the requirements of the worker, are exclusive prerogatives of the engineer. Theoretically it has been recognized that each of these subjects has its psychological aspects, to which it might be presumed that a psychologist could contribute. Practically, the management engineer has known these problems so much more intimately in their industrial setting that the psychologist unversed in factory practice has for the most part preferred to turn his energies in other directions. Indeed, it may be confessed that certain forays by amateur industrial psychologists into this territory have been ludicrous enough in their outcome to lend emphasis to this unfortunate tradition. Industrial executives must share in part the responsibility for these fiascos. Over and over again they have engaged as psychologist a novice whose claim to the title was that he had studied elementary courses in college, or perhaps had been an assistant in routine psychometric work in the Army or in a child guidance clinic. One cannot help smiling at such choices, made by business men who would never for a moment think of putting a complicated problem of mechanical development or chemical research on the shoulders of an inexperienced or half-trained engineer.

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[1] Part of an American report on Fundamental Relations in Industry presented at the First Triennial Congress of the International Industrial Relations Association, held at Cambridge, England, July, 1928.

But enough by way of apology and explanation. What benefits, if any, have accrued to industrial relations in America because of the work of psychologists?

Some of these benefits we shall find are broad and general. Some are specific and detailed. They can best be envisaged after we have listed the chief industrial problems which are primarily psychological or which present psychological aspects.

Psychological Problems of Industry

Psychology is variously described as the positive science of conduct, the science of behavior, the science of experience. Whatever the limitation of scope implied in any such definition, the fact is that one finds today in any systematic volume on psychology, a wealth of fact and generalization with respect to human nature. Those problems of industry may be considered psychological which involve questions of human nature.

Foremost are the problems which have to do with the *worker in relation to his work.* Many such problems arise in helping the worker find the simplest, easiest, most natural ways of doing his work; conserving his energy; reducing fatigue; increasing quality and quantity of output; eliminating personal injuries and lost time due to accidents; removing unnecessary fears and irritations connected with the work; reducing unrest, discontent and dissatisfaction with the job and with the working conditions surrounding it; and increasing the laborer's store of contentment, pride and satisfaction in his accomplishment. These are all basic practical problems of industrial management, most of them capable of at least partial solution through the application of shrewdness and common sense, but all of them offering a challenge to the psychologist to apply his science and to supplement common sense by analysis, objective measurement and experimentation. Common observation of the behavior of workers engaged in heavy labor or in work requiring close attention, might well have suggested to any sensible supervisor the economy of insisting upon appropriate properly spaced rest periods; but the fact is that this device has rarely been employed except where science and controlled experiment have first demonstrated its worth and indicated the optimal distribution of rests for the particular tasks in hand. Scarcely more than a good beginning has been made in the scientific understanding of rest periods in relation to fatigue, monotony, workers' reveries, outbursts of temper and radicalism. Here, as in other aspects of the job in its relation to the individuality of the worker, the psychologist has significant opportunities for industrial application of his science.

A second group of psychological problems arises out of the *relations between a worker and his fellow workers.* How to harness the impulse to competition, and insure a healthy rivalry for high quality of output or freedom from accidents; how to eliminate the conflicts, irritations and jealousies which sometimes clog the human machinery of the factory; how to prevent loss of working time in idle banter while supplying on appropriate occasions ample opportunities for good fellowship—these are questions which are ordinarily left to chance or to common sense. More basic is the best means of developing a substantial group solidarity, a ready helpfulness, a willingness of experienced workers to take new employes in hand and teach them the practices and ideals of the shop. Then, too, workers sometimes tend to teach each other various fears and notions leading to conscious restriction of output. They may spread an apprehension of layoff or of piece rate cutting, when no genuine basis for it exists in reality. Here the problem arises as to how such unwholesome influences of workers on one another can be minimized, or replaced by influences which make for better mutual education and co-operation. These are complicated problems of practical social psychology.

Yet a third group of problems centers in the *relations of the worker and his immediate supervisor.* These relations may be harmonized by making sure of the reasonableness of work requirements; by making work assignments and instructions clear and definite; by introducing an equitable routine procedure of distributing work and materials, to do away with the possibility of partiality or favoritism in these regards; and by making the supervisor a skillful instructor and an understanding helper of his men, as well as a fair and just disciplinarian. The psychological aspects of these processes are sufficiently obvious.

No less psychological in essence are many of the problems arising out of the *worker's relations to the management.* Consider, for example, the assurance of steady employment. This has often been made possible through improved market analyses, business forecasting and careful scheduling of production. The effect produced on the worker by relief from the overshadowing fear of layoff is a psychological fact of major importance. So, too, with many questions of wage rates, methods of payment, and policies regarding stock ownership, insurance, pensions, housing, loans, vacations, facilities for education and recreation, and the like. The adequacy of the machinery provided for airing and prompt adjustment of grievances reflects the management's grasp of practical industrial psychology. The same may be said of its success in providing suitable recognition of merit and competence, not so much through resort to non-financial rewards and recognition (although these have their value and are often prized), but rather through proper payment by results, and adequate provision for advancement. Many economists are prompt to insist today that the problem of wages has its psychological aspects.

Group relations of workers and management have presented continuing problems whose psychological aspects are sometimes almost as perplexing as their more obvious economic phases. The reader need only remind himself of the misunderstandings, the mutual suspicions, the conflicting preconceptions and unyielding prejudices which too often have beclouded the thinking of workers' representatives and employers alike, when collective versus individual bargaining, trade union versus shop committee organization and similar issues of joint relations have been brought forward.

Both parties have at times resorted to espionage in their fact finding, a practice as unsound in its psychology as in its ethics. Both have been prone to color their inquiries with preconceived conclusions. Better methods of ascertaining the truth about actual and imaginary grievances, and the purposes and practices of employer and employe alike, will tend to bring about more wholesome industrial relations. The duty of undertaking to improve these techniques of fact finding is one which the psychologist must not hesitate to accept. Already J. D. Houser, B. V. Moore, L. L. Thurstone and others have made a promising start in this direction.

The psychology of leadership requires clarification. It is not implied that there is any need for more argument or pooling of opinion as to the personal qualities which make for effective leadership within the ranks of labor or of management. What the psychologist demands is first of all a new, minute, comprehensive description and analysis of what the real, successful industrial leaders do. When this factual foundation has been properly laid, the drafting of better plans for discovering and developing the leaders of the future will not seem so complicated. Opportunity and reward for exercise of constructive leadership and originality by workers and executives of whatever status will probably then seem a most natural policy. If channels are open for the flow of ideas and ability from one department or level of the organization to another, if real leadership wherever revealed is given its chance, both individual and group relations may be expected to benefit.

Relations of workers and management are already profiting from the studies which psychologists and educators have made regarding the development of leaders. Consider the function of an executive as a trainer of men. Studies of the techniques of teaching particular skills, habits, attitudes and items of essential information have led to many generalizations with reference to the processes of training. Excellent methods have been evolved for making the necessary preliminary analyses of work to be done, difficulties encountered, items to be taught. Procedures have been developed for determining the content and outlining the successive steps in a training program. Practicable techniques for giving preliminary instruction and for training on the job have been evolved. Investigations have even been made as to the difficulties met in getting executives themselves to learn and to use these improved techniques of teaching their subordinates, and as to the best ways of overcoming these difficulties. In such ways the methods of research are being profitably applied to educational problems of industry and business. As the results of such researches gradually find their way into the practice of supervisors and executives, relations of workers and management cannot fail to profit thereby.

One now hears more than formerly about the psychological importance to industry of yet another group of relations, those of the worker to his family and, indeed, *to the entire circle of contacts* outside as well as inside the factory gate. Psychologists with a psychiatric background have properly been reminding management that careless accidents, temper, trouble making, insubordination, absenteeism and other sorts of objectionable behavior often have their roots in worries traceable to conditions far from the immediate setting. Intensification of these worries during periods of excessive fatigue has been demonstrated. Attention has been called to the damage suffered by certain temperaments as a result of pessimistic reverie during the course of long continued monotony. One obvious implication is that a sound industrial psychology must reckon not only with temperamental differences between workers and their relative susceptibility to the effects of different sorts of repetitive or taxing labor; it must know not only the conditions in the plant predisposing to monotony or fatigue; it must realize also the influence of the varied conditions that modify the employe's anxieties and hopes, his fatigue and recuperation, both during and *after* working hours.

But it is one thing to recognize the importance of the total situation in determining a worker's inner feelings and outward behavior, and quite another matter to infer that, therefore, wise personnel practice will seek to inquire into intimate personal and private circumstances in order better to be able to help make suitable adjustments. There must be no trespass on the worker's independence and self-respect. It is a neat problem of practical psychology, how to mold conditions so as to effect a maximum of well justified contentment and willing efficiency, without risk of wrecking the whole morale through resentment against uninvited paternalism. Mr. Ford marched up this hill, and then marched down again. The practical solution reached by some executives has been to leave with the workers themselves the opportunity for initiative in such matters, and for management to stand ready to move only when, as, and if needed and invited so to do.

The psychological problems of industry have now been surveyed as they present themselves to the student of the worker in his relation to his job, to his fellow workers, to his immediate supervisor and to the management of the industry in which he is engaged. Not only his relations as an individual employe have been considered, but also his relations as a member of a group which, as a group, has vitally important relations both with the management of the particular concern which gives him employment and with the industry as a whole. While there is little doubt that the most varied and intriguing psychological problems arise in studying the worker in relation to his own work, there is no question that the psychological aspects of the situation are of vital importance in considering each of these other relations also. In what ways has the science of psychology influenced industrial thought and practice with reference to these industrial relations?

How Psychology Has Influenced Industry

Industrial relations in America have been influenced by psychology in three ways. Industry has responded to psychology as science, as point of view and as method.

Psychology as Science. Psychology as a science consists of a systematized body of facts and generalizations about human nature. Foremost among the industrially significant facts of modern psychology are those which reveal the enormous range and variety of differences between people. Scarcely a generation ago American thought and practice was still somewhat under the influence of the political doctrine of equality which had been held most fervently at the time when the nation was born. To be sure, no one had seriously contended that all men are created equal in talent; but scarcely anyone had realized how vast are the differences in native endowment and capacity for achievement until Cattell, Boas, Thorndike and others, exploring the trail originally blazed by Sir Francis Galton, found ways of quantifying and measuring individual differences. They gave graphic and mathematical expression to these measurements.

While studying the wide range of differences which people exhibit in their capacity to discriminate colors, sounds, extent of arm movements and other sensory data, they also carried forward investigations in reaction times which showed how greatly people differ in motor capacity. After many of the relatively simple processes had been examined, differences in types of attention were observed. Other investigations were centered on the measurement of differences in ability to localize sounds, to perceive spacial relations, to remember, to manipulate and construct.

The discovery of the possibility of devising units and scales for use in measuring such differences of ability was an epoch making invention. Its application was rapidly extended to the measurement of achievement in school work and has had a profound influence on educational practice. Meanwhile procedures were devised—following the pioneer work of Binet and Simon—for measuring the rate and extent of mental development. Concepts of mental age and the intelligence quotient became current. Convenient means for examining large numbers of persons at the same time were perfected; and during the war, data were secured which revealed in spectacular relief the vastness of the spread of human abilities as well as their proneness to cluster about the central tendency of mediocrity.

Differences between individuals not only in abstract intellect but also in social and mechanical abilities were studied. Certain trade tests, for measuring proficiency in different occupations, were standardized. People's interests were made the subject of inquiry, and techniques were developed for quantifying differences in mental attitudes, likes and dislikes, occupational preferences and personal tastes. More recently the ambitious task has been undertaken of measuring the strength of volitional tendencies. Character, as well as intellect and temperament, has come within the range of quantitative measurement; and while the reliability of the methods so far developed for measuring character is so low that few psychologists will venture as yet to draw practical inferences from them, it is nevertheless significant that the idea of mental measurement has now been extended until it comprehends the entire personality.

Partly as a consequence of these researches, it is recognized, more clearly than formerly, how much individuals differ from each other in originality and initiative, in output of energy, in tact or in social sensitivity, and in self-control, as well as in general intelligence, and in a long array of specific abilities. All these facts, tersely put by Cattell and Thorndike and emphatically reiterated in public address and in semi-popular writings by Walter Dill Scott, Münsterberg, Goddard, Terman, Hollingworth and many others, have influenced the thinking and practice of industrial leaders.

Many industrialists of today, it may be recalled, were themselves students of elementary or advanced psychology in college when individual differences were first stressed. Later, in positions of business responsibility, some of them recognized acutely the need of personnel procedures which give due emphasis to these facts of human nature. Functional organization of personnel activities in factory and office, and development of techniques for personnel classification, transfer and promotion, job analysis, employment interviewing, placement, training and follow-up, probably proceeded somewhat more rapidly because of what psychology had done to make more evident the nature and extent of individual differences.

Of practical moment also have been the findings of psychology regarding the relationship between various abilities. For instance, the law of compensation has been found inapplicable. Common belief had held that the person who is greatly superior to his fellows in some regards is probably inferior to them in others—that if he is very talented in mathematics, for example, he is probably something of a dullard in athletics or in art. The facts have been found to be quite the opposite. Persons who are found to be highly superior in one ability are more often than not above the average in any other desirable trait. In other words the correlation between favorable traits is quite generally positive. At the same time, the correlation is in most instances low. Psychologists have often been surprised to find how slight is the association between abilities apparently very similar. If, as Spearman and others contend, there are certain *general factors* characteristic of a person's make-up—call them intelligence, energy, perseverance or what you will—it is certain that there are also a great number of quite specific abilities, very largely independent of one another.

These findings have lent emphasis to the need for the employment interviewer to be very cautious in inferring future accomplishments from fragmentary data, whether these data are in the form of impressions gained in conversation, mental test performance, school record, or reports from former employers. He needs all the information he can get. He especially needs to find out which items are really significant, under the conditions of work which prevail in his own plant and in the local labor market.

Another inference from these facts regarding the specificity of abilities has to do with the nature of industrial training. There is sound warrant for the tendency toward better training on the job rather than toward more formal training of a general sort.

To precisely what extent industrial practice in the United States has been modified by the body of psychological knowledge regarding individual differences and the correlation of abilities, who shall say? It is obvious that the tendencies of the past twenty years in employment, training, supervision, transfer and other personnel functions have been in the direction of greater recognition of and provision for wide differences in endowment. Public school practice has also been modified in many ways which have made it possible for multitudes of young people more easily to effect a satisfactory adjustment with the working world. Such changes might conceivably have taken place, even though psychologists had not been measuring, analyzing and comparing so many aspects of so many people. It seems reasonable, however, to suppose that the findings of these kinds of psychological research have directly as well as indirectly had a real influence in industry.

Much the same might be said regarding the generalizations from research in educational psychology. One outstanding characteristic of man is his educability, and psychologists have steadily been prying deeper and deeper into the laws of learning. Principles governing the formation of habits, acquisition of skills, mastery of technical knowledge, elimination of gross defects of personality, development of social effectiveness, modification of likes and dislikes, and inculcation of ideals and attitudes —all these are applicable in offices, stores and factories as well as in school or college. Some of the best data regarding effects of practice and of fatigue on the work curve have come from experiments in psychological laboratories.

The doctrines of interest, and of attention and distraction, have had their application where safety devices were to be invented and installed; where jobs were to be classified according to their psychological requirements; where workers and students were to be advised with reference to their future vocational plans. The psychological theories most prevalent a dozen years ago regarding instincts and the fundamental drives which motivate human conduct, have influenced the thinking of industrial leaders regarding financial and non-financial incentives, group spirit, the damage done by fear and the value of insuring to manager and worker alike his sense of self-respect and his belief in the worth-whileness of his labor. Writers like Robert Valentine, Carleton Parker, Ordway Tead, Z. C. Dickinson, Robert Bruere, H. C. Metcalf and Whiting Williams interpreted these doctrines for economists and engineers, bridging the gulf that too often divides the psychologist from the industrialist.

Perhaps enough has been said to illustrate the way in which the subject matter of psychology has tended to affect industrial practice. A single case, more concrete than those already mentioned, will serve as a sample of repeated instances in which the discoveries of the psychological laboratory have found useful application.

For many years Professor C. E. Ferree[2] in the psychological laboratory of Bryn Mawr College concentrated his research on problems of the efficiency of the eye under varying conditions of illumination. He developed new apparatus and precise procedures for measuring the fatigue of vision. Using these methods, he worked out the principles which must apply to all determinations of the relative effectiveness of different intensities and distributions of light. He compared the merit of direct, indirect and semi-indirect sytems. When his conclusions were first announced they ran counter to the tenets currently held by engineers; but today they are commonplaces of illuminating engineering practice. Thousands of factory employes, now doing their work under more favorable conditions of illumination, will never know that they have in part to thank a research psychologist for their relief from the annoyances of unnecessary glare, distraction and eye strain.

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[2] Now of the Wilmer Institute.

Psychology as point of view. Less tangible than the effects of these concrete products of psychological research, but none the less real, has been the influence on American industry of what may be called the psychological point of view. In essence this point of view consists in a more than ordinarily tenacious belief that human experience is understandable, that human behavior is not a spiritual mystery but a natural phenomenon like other phenomena of the organic world. Such a belief leads to the persistent attempt to understand one's fellows, to appreciate their motives and ambitions, to comprehend their shortcomings and their possibilities. It makes one impatient of superficial explanations of unsatisfactory employe behavior as due to "carelessness" or "laziness" or "pure cussedness." One asks, "Why was this motorman careless?" and proceeds to get the facts about his previous training on the job, his treatment by supervisors, his length and distribution of working hours, his health, his eyesight, his scope of attention, his worries and tendencies to reverie. Then such a vague blanket trait term as "carelessness" drops out of one's vocabulary. Moreover, the psychological point of view prevents an executive from letting his personal feelings warp his judgment. It helps him to be at once more objective and more intelligently aware of points of view other than his own.

The psychological point of view is that of the scientist trained to focus the searchlight of inquiry on every puzzling problem of human adjustment. It is identical with the point of view of scientific management in so far as scientific management concerns itself with the human problem of industry. If there has been any vital difference in point of view between industrial psychologists and management engineers, it is with reference to their primary purpose. The industrial psychologist has wanted first of all to help the worker, in simplifying his methods of work, bettering the conditions under which his work is done, improving his training, and developing personnel techniques which will facilitate his adjustment to the occupation in which he will find the most satisfaction. Incidentally the psychologist may believe that these services will perhaps benefit the industry, the management and the social order also. The engineer has similar objectives but is ordinarily thought of as placing first the economic stability, prosperity and usefulness of the enterprise. The personal satisfactions accruing to competent, well paid, well trained employes are his secondary objectives.

While this contrast in points of view of psychologist and management engineer may have some historical warrant, particularly in England, it cannot be said to hold universally in America. The writer knows personally Taylorites who seem to him to place considerations of human betterment first, and to regard the industry which they plan for or manage merely as a means to the self-realization of the workers and supervisors who constitute its personnel. He also confesses an acquaintance with psychologists as well as engineers both in America and in Europe who have shown themselves willing to place their talents at the disposal of employers with a single eye to profits.

This difference in attitude and primary interest is not inherent in the science; it is a personal matter. It may depend on temperament, or on the social philosophy one holds.

The question of priority of objective might be a matter of more grave concern at this point, if it were not that the farsighted investigator—be he psychologist or management engineer—sees clearly that he must travel much the same road in either event. After all, there is a considerable identity of interest of employes, managers, owners and public. An industrial psychologist in a chocolate factory recently stated his objective as follows: "The purpose of the psychologist is to see that the workers leave the plant at night neither fatigued nor irritated nor nervous." He showed not a trace of interest in increasing the owners' profits. But when I asked the president of the corporation why he had this psychologist in his factory, the prompt and decisive answer was, "I find it pays."

Psychology in America has contributed to the point of view that it pays in the long run to attempt to understand the deep-lying motives and ambitions of people, and to work with the current of human nature rather than counter to it. It has made this point of view explicit in its application to problems of vocational adjustment, including placement and training, in conformity with the individual's proclivities and talents. In other directions, also, the psychological point of view is coming to be more frequently taken, with promise of leading to better mutual understanding and more co-operative relations throughout industry.

Wholesome as such a point of view may be in approaching questions of human relations in industry, it will not carry the manager far toward practical solutions of his difficulties unless he has at hand the necessary appropriate techniques for problem solving. This brings us to the third way in which psychology has influenced American industry; through its method.

Psychology as method. The main methods of psychological research are two: experiment and statistics.

The task of any natural science may be stated in most general terms as the determination of the relationship between variables. The variables with which psychology deals include the environmental forces and conditions which influence behavior, as well as the innate capacities, habits and attitudes of individuals in interaction with the world in which they work and live.

It is sometimes said that the biological sciences, of which psychology is one, differ radically from the physical sciences in that the variables with which they have to deal are more numerous, complex and difficult to control. Wherever all the variables, or all but one, can be controlled, the ideal method is that of experiment. Here the ingenious investigator can test his hypothesis by setting up a crucial situation and making observations or measurements which are decisive as to the manner in which the independent and the dependent variables are related. If, however, there are independent and uncontrollable variables which make impossible the resort to exeriment, the scientist has recourse to the method of statistics. This is a method which, thanks to Pearson, Spearman, Thorndike, Kelley, Thurstone and others, has been developed extensively in its application to psychological data. It has proved to be an invaluable complement to the methods of the experimental laboratory.

The refinements of statistical procedure evolved in connection with psychological research have been slowly finding their way into industrial personnel studies. If, before the war, one talked to American business men about correlations, scatter diagrams, regression lines, central tendencies, standard deviations, or measures of reliability and validity, they listened with amused tolerance, if at all. Today these concepts are fairly well recognized as a necessary part of the mental furniture of anyone who undertakes to deal precisely with the data of human behavior. They have found their place in the thinking and writing of many who are undertaking to understand the more fundamental aspects of human relations as they exist in industry.

The method of the controlled experiment on the other hand, although simpler to understand and often more decisive in its findings, has unfortunately not been as generally adopted by industry. To be sure, there have been innumerable so-called experiments tried in industrial relations. But most of these have not been carried out according to the canons of science. A manager has decided, for example, to try the experiment of changing his method of remuneration. In place of an hourly wage he has introduced a straight piece rate; or instead of piece rate he has tried one of the currently popular task-and-bonus systems. But in most instances he has introduced at the same time several other variables. He has changed foremen, or improved the routing of materials, or insisted on a more thorough coaching and follow-up of new employes, or installed a better ventilating system. So when, after several months, his accounting department reports a decided lowering of unit labor costs, it is still a matter of opinion whether these economies are to be credited to the new method of payment by results. Industrial management cannot hope to reap the full benefits of the scientific method as applied to the study of the human problems of the factory, until it is ready to make a larger number of genuinely scientific experiments.

Psychology has demonstrated the usefulness of the methods of experiment and of statistics in solving some of the complicated problems of human relations. It has developed refinements of technique which are readily carried over into industrial research. Responsibility rests with the individual investigator, however, to furnish the penetrating insight and the ingenuity which alone can formulate brilliant and industrially significant hypotheses for scientific study.

Psychological techniques have sometimes been borrowed by industrial engineers, as in the case of recent fatigue studies, earlier investigations having failed because the effects of suggestion were not controlled. In other instances, the psychologist has been borrowed as well as the technique, as when Thorndike helped carry out the research of the New York State Ventilation Commission, which established the primary importance of air movement. The Society for the Promotion of Engineering Education has repeatedly called into its councils such psychologists as Seashore and Thurstone. And so the general methods and specific techniques of psychology, as well as its point of view and its subject matter, are gradually being appropriated by industrial engineering.

Agencies for Furthering Industrial Psychology

A sketch of the influence of psychology on fundamental relations and conditions in American industry would not be complete without mention of certain agencies which have been carrying forward psychological research and slowly spreading throughout the texture of business and industry some familiarity with psychological content, method and point of view.

Chief among the agencies which have been furthering psychological developments are *the universities.* Every university has its psychological laboratory for research. It also offers courses of instruction which are taken by great numbers of students. While many of these courses are general in nature, some of them treat specifically the psychological problems of business, such as advertising and selling, and also touch upon applications of psychology to vocational selection, learning, fatigue, incentives, group relations in industry and other problems of management and of individual adjustment. These courses of instruction in applied psychology are for the most part elementary, and broad in scope rather than intensive. During the past twenty years they have served to introduce many thousands of young people to the basic principles of industrial psychology as first outlined by Münsterberg and as formulated from time to time in the books of Scott, Hollingworth, Poffenberger, Swift and others. Such books have had some circulation among mature business men as well as students. Unfortunately the readers have often, especially since the war, been so intrigued by the chapters dealing with mental tests and other devices for the measurement of individual differences that they have overlooked the relatively more fundamental psychological considerations which alone can give to mental test procedures their true significance.

In a few universities there exist also centers for advanced training and research in industrial and commercial psychology. Among the foremost at the present time are the University of Michigan in Ann Arbor, the University of Pennsylvania in Philadelphia, Columbia University in New York, and the University of Chicago. Stanford University in California, Northwestern University in Evanston, the University of Pittsburgh, the University of Minnesota in Minneapolis, the University of Iowa in Iowa City, the University of Ohio in Columbus and some of the other state universities are hospitable to such research. Promising developments are now taking place in the Harvard Graduate School of Business Administration in Boston, and in Yale University in New Haven. Curiously the emphasis in many of these centers has been on the psychological problems of commerce rather than of industry. Curiously, too, the great *engineering schools* or institutes of technology have completely neglected psychological research. The outstanding exception to this sweeping generalization is the Carnegie Institute of Technology in Pittsburgh, where was established under the writer's direction in 1915 the first Division of Applied Psychology in any American Institution, and later, the first *Bureau of Personnel Research,* and where, for eight years, a notable group of psychologists were engaged in research on problems of importance to co-operating industries and business concerns.[3] Kenagy and Yoakum's book on "Selection and Training of Salesmen," Strong and Uhrbrock's "Job Analysis and the Curriculum with Special Reference to the Printing Industry," and Craig and Charters' "Personal Leadership in Industry" record some of the more enduring products of these studies. One outgrowth of this movement at Carnegie Institute of Technology was the establishment in 1917 of the *Research Bureau for Retail Training.* This Bureau, now permanently endowed and affiliated with the University of Pittsburgh, has recently published a summary volume covering ten years of continuous psychological, economic and educational research. The influence of its work on personnel practice in department stores has not been limited to the local constituency but has been felt throughout the nation.

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[3] An historical account of this development was published in the *Scientific Monthly,* February, 1923, pp. 142-159. A bibliography of publications of the Division of Applied Psychology up to that time contained 63 titles.

That competing firms have co-operated in support of such investigations is significant. That the findings have in large part been passed on to other firms for the benefit of all and for the public good is evidence of broad mindedness. It well illustrates the growing conviction in American business and industry, that the ancient practice of maintaining trade secrets wherever possible is sometimes an unprofitable if not a ludicrous form of selfishness.

Such limited psychological research as has been carried forward by *individual corporations* has likewise for the most part been open to the inspection of any visiting scientist or personnel manager. A few street railway and taxicab companies with laboratories of their own for investigating individual susceptibility to accidents and related psychological problems of transportation, have not hesitated to exchange methods, data and results. Among such firms as the Eastman Kodak Company, the Western Electric Company, the General Electric Company and the American Telephone and Telegraph Company there has been free exchange of specifications for psychological laboratory equipment and of other technical information.

Several of these companies contribute to the support of the *Personnel Research Federation* which maintains a clearing-house for the exchange of research information, as well as a staff for consulting work and for carrying forward specific studies. Among its current investigations is one regarding the effects on accident reduction of individual attention to workers who are found to have a susceptibility to accidents. Another investigation, designed in the end to facilitate the flow of correct information from workers to management, consists of a study of the technique of the personal interview. In this task of jointly furthering the scientific approach to the human problems of industry, a number of government agencies, university departments and independent research organizations likewise co-operate. The Engineering Foundation, the National Research Council and the American Federation of Labor initiated this co-operative movement which signalized a definite recognition of the need for co-ordination of research plans and extensive stimulation of sound research developments in industrial psychology and related aspects of personnel science. *The Personnel Journal,* now in its seventh volume, furnishes the record of accomplishment to date.

The establishment of the Personnel Research Federation followed upon the research developments at Carnegie Institute of Technology already mentioned, and other undertakings which had received an impetus from the widespread interest in applied psychology awakened by the military accomplishments of psychologists and personnel managers during the war. The Scott Company, for example, with Walter Dill Scott as its guiding spirit, for four years operated as a firm of personnel consultants to large business concerns, and made familiar to American industry a number of psychological concepts, principles and techniques recorded in the volume, "Personnel Management," by Scott and Clothier (1923). The immediate stimulus toward the establishment of the Personnel Research Federation, however, came from two sources. One was a series of significant investigations as to the value of the psychiatric approach to industrial problems, made by the late E. E. Southard, M.D., at the request of the Engineering Foundation. The other was a recognition by the National Research Council, of which James R. Angell was then the head, and by its Division of Anthropology and Psychology, of which the writer was Chairman, that the problems of industrial psychology were of increasing importance and that there was some danger of duplication of research effort unless there existed an agency to facilitate exchange of information, to survey the field as a whole, and to plan constructively in the light of known needs and facilities for research.

The National Research Council, which represents mainly the physical and biological sciences, has continued its efforts to further practical psychology, for example in its applications to problems of highway safety. More recently the Social Science Research Council has come forward, and as one of its activities is helping to plan and to finance selected investigations in industrial psychology. Both of these Councils also offer each year certain fellowships for advanced students of psychology, and a few of these investigators have chosen as their topics for study problems in industrial psychology and related aspects of personnel science. The Psychological Corporation, founded by J. McKeen Cattell in 1921 as a means of making the services of American psychologists conveniently available to industry, has served useful purposes, not least of which has been to inform inquirers as to who and where the real psychologists are, in contradistinction to the dilettantes, charlatans, character analysts and pseudo-scientists who prey upon the public in America as in Europe.

The readiness of business firms to co-operate for the advancement of knowledge in the common interest, may again be exemplified by their support of such national associations as the American Management Association and the Taylor Society (an international association to promote the science and the art of administration and of management). Both of these organizations have from time to time encouraged discussions of psychological problems and of psychological research before their membership. It is a wholesome sign that the participation of psychologists in the work of these associations has grown somewhat during the past four years.

Papers of industrial significance are occasionally but all too rarely presented before the American Psychological Association. These most often are related to problems of vocational selection and placement, since American psychologists have concerned themselves with determination of interests and abilities by means of various techniques of testing, rating and individual appraisal, more often than with problems of the simplification of work, industrial fatigue, monotony, incentives and similar practical problems of the factory.

One exception to this indictment is Mrs. F. B. Gilbreth, who years ago had a clear vision of the problem. She worked jointly with her husband to spread among industrial engineers some understanding of the psychological point of view, especially with reference to fatigue, and to develop ingenious techniques for use in motion study and work analysis. In her private institute she has continued to introduce each year a few engineers to this point of view and to the refinements of these techniques. Another exception is C. S. Yoakum, whose contacts with the automotive industry and with business concerns have enabled him to formulate specifically problems of personality study, work histories, personnel accounting and measurement of the effects of management policies, and whose psychological researches in vocational guidance are basic. Elton Mayo, to mention yet another, has brought the findings of psychopathology and the doctrines of Janet stimulatingly to bear on problems of irritation and irrationality in the factory. A number of younger psychologists are engaged in work which has its industrial bearings, and the temptation is strong to touch upon their individual contributions. Our generalization would, however, apply to the most of them, namely, that they are more often interested in employment psychology than in the psychology of the worker at work.

This paper, already too long, must be brought to a close with a word about industrial psychology in relation to government agencies. It may surprise European readers to learn that the federal government of the United States has never established an agency for research in industrial psychology, such as the Industrial Fatigue Research Board of Great Britain. Admirable research, to be sure, has been done by the Bureau of Mines in co-operation with the Public Health Service. The Department of Labor and the Federal Board for Vocational Education have published many studies on topics related to industrial psychology. But the research work, at least so far as the writer is aware, has been done for the most part by economists, educators, physicians or engineers, rather than by investigators whose training has been primarily in psychology. Only one agency of the national government has on its staff a well known psychologist: L. J. O'Rourke, of the U. S. Civil Service Commission. In a strategic position, he is changing for the better the character of the postal service and other government offices, by judiciously applying the techniques of psychological science to the procedures used in selecting and placing government employes. A few municipal and state governments are similarly benefiting by psychological research, and this movement is being fostered by the Bureau of Public Personnel Administration.

And so, in conclusion, it is admitted once more that psychology is influencing industrial relations and conditions in the United States most directly through its contributions to vocational selection and the understanding of individual differences. Within other equally important areas of inquiry, the influences of psychological content, methods and point of view have been more indirect, and probably less potent than they will be after labor and management come to a clearer realization of the essentially psychological nature of many of their difficulties, and after more psychologists, in turn, have had opportunity to come to grips with these difficulties, not as they are defined in books, but as they crop up in the daily relationships of factory operation.[4]

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[4] Typical of influential books written by economists in order to make fruitful for industry the doctrines of psychology, may be mentioned Carleton Parker's *"The Casual Laborer,"* Veblen's *"Instinct of Workmanship,"* Tead's *"Instincts in Industry,"* Z. C. Dickinson's *"Economic Motives,"* and Whiting Williams' *"Mainsprings of Men."*

Full of practical suggestions for self training and development of supervisors and young executives is Craig and Charters' *"Personal Leadership in Industry."* C. R. Allen's *"The Instructor, the Man and the Job"* is at once psychologically sound and immediately useful.

In employment psychology we have had the books of Link, Chapman, Kingsbury and Kornhauser, Laird, Snow, Griffitts, Kitson, Bingham and Freyd, and Burtt.

Of general interest are Overstreet's *"Influencing Human Behavior,"* Helen Marot's *"Creative Impulse in Industry,"* Mary Follett's *"Creative Experience."* Elliott Smith's *"Psychology for Executives,"* and John Dewey's *"Human Nature and Conduct."*

The two most substantial manuals on personnel principles and procedures are Tead and Metcalf's *"Personnel Administration,"* and Scott and Clothier's *"Personal Management."* The latter emphasizes psychological considerations. Among volumes of narrower scope but more intensive treatment, *"The Selection and Training of Salesmen,"* by Kenagy and Yoakum, is outstanding because it embodies the findings of years of research and experiment in its field.

Three periodicals should be mentioned: The oldest of these, *The Journal of Applied Psychology,* publishes technical contributions by psychologists not only to business and industry, but also to law, medicine and other fields. *The Personnel Journal,* also technical, while narrower in scope, confining itself to the subject matter of its title with emphasis upon educational and vocational adjustment, is on the other hand more inclusive, approaching the personnel problem from the economic as well as the psychological angle. *Industrial Psychology* is edited for the business executive, and interprets for him the pertinent findings of psychological research and discussion.

EVEN the development in mechanization does not do away with the problem of vocational fitness; but the new aspects of this problem determined by mechanization should be clearly recognized. Such new aspects are: (1) that the fitness for certain jobs cannot be determined *before,* but only *during* practice; (2) that the degree of fitness for certain jobs can be less and less measured by the size of the output, but can be measured only by *other* criteria.

To arrive at a systematic investigation of fitness, we need (1) a classification of the different occupations on the basis of the importance of the fitness of the worker in relation to the output; (2) a classification of the occupations on the basis of the criteria which indicate the greater or lesser degree of the fitness of the workers.

In this connection I shall briefly call attention to the work of the "Arbeitsleistungsausschuss in der deutschen Wirtschaftsenquete" in order to make a new suggestion for future lines of research in the field of the science of labor.

The objective of the "Arbeitsleistungsausschuss" as affixed by national law is to determine "the way in which, according to data collected in recent years, changes in hours of work and in wages have influenced human efficiency." The data collected by the *Ausschuss* during the last eighteen months seem to indicate that future research, starting from changes in the output, must determine (1) the degree to which changes in *output* depend on changes in human efficiency; and (2) the cause for any observed change in human efficiency.

As regards the conditions determining efficiency, vocational fitness plays a role, as well as wages and hours of work; just *what* role it plays besides the other conditions determining efficiency and output, as well as the degree and nature of this role, have not as yet been determined by systematic research, since so-called technopsychology has been viewed from too narrow an angle and has not found its proper place in the science of labor. (Otto Lipmann, "The Human Factor in Production," *The Personnel Journal,* Vol. VII, No. 2, August, 1928, p. 95, translated from the German by Heinrich Klüver.)

Scientific Management[1]

An Analysis With Particular Emphasis on Its Attitude Toward Human Relations in Industry

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SCIENTIFIC management has a number of objectives, according to the point of view from which it is examined. The following are outstanding: to make enterprise successful by good judgment in gauging the demand for the commodities or services to be produced and by economical application of the human and material energies involved; to make work agreeable in its physical conditions, human relations and the satisfaction of a job well done; and to promote human welfare by increasing productivity, improving distribution and raising the standard of living.

It was a practical human relations problem arising out of an effort to secure productivity that in 1880 stimulated Taylor, then an inexperienced boyish foreman, to those researches out of which scientific management developed.[2]

At that date mechanization of American industry was under way, operations were becoming specialized, workers were more scattered throughout larger plants, experience with unemployment had generated a spirit of "make work," recent experience with the cutting of piece rates had caused distrust of management, voluntary effort was at a low state of efficiency, supervision had not adjusted itself to the new conditions, and generally morale and productivity were low. Advanced from worker to foreman, young Taylor not unnaturally imitated the bosses under whom he had worked and attempted to force production by driving the workers, which was the method of foremanship then customary. A fight with the men resulted. Taylor won out, but the experience hurt what was a sensitive and sympathetic nature and disillusioned him. "I was a young man in years, but I give you my word I was a great deal older than I am now, what with the worry, meanness and contemptibleness of the whole damn thing," he said years later; "I made up my mind either to get out . . . or to find some remedy for this unbearable condition."[3]

The youthful foreman did some hard thinking and decided that management was chiefly at fault. Throughout American industry its only concept of a proper day's work was what it could drive workers to do. But it is management's business to *know* what is a proper day's work. The only way to know is by research and experiment. Thereupon Taylor secured permission to conduct "some experiments," the purpose of which he kept to himself. He did not think they would take over six months, but they continued more than twenty-five years. Almost immediately, however, they yielded results in the nature of measured possibilities of work which put supervision and management in that shop on a factual basis. Output was planned, controlled and increased under conditions agreeable to the workers. Never again did Taylor have controversy with workers under his supervision, and never have any of those who have followed his methods faithfully.

The body of procedures which grew gradually out of these investigations and experiments came to be known as "The Taylor System," and to the doctrine and principles later derived from these procedures was given the name "Scientific Management."[4]

Scientific management, says Taylor, is primarily a mental attitude toward work, and only secondarily a system of practices. "The essence of scientific management consists in the application of certain broad general principles, and the particular way in which these principles are applied is a matter of entirely subordinate detail . . . there is not one who uses the same methods in any two successive establishments," he wrote to a friend.[5] Briefly, this mental attitude involves "the substitution of exact scientific investigation and knowledge for the old individual judgment or opinion, either of the workman or the boss";[6] and "the substitution of peace for war, . . . of hearty brotherly co-operation for contention and strife; of both pulling hard in the same direction instead of pulling apart; of replacing suspicious watchfulness with mutual confidence.'"[7]

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[1] Part of an American report on Fundamental Relations in Industry presented at the First Triennial Congress of the International Industrial Relations Association, held at Cambridge, England, July, 1928.

[2] Copley, F. B., *"Frederick W. Taylor, Father of Scientific Management,"* New York, Harper & Brothers, 1923, Vol. I, pp. 3, 157-189, 205-245.

[3] Op cit. I, p. 5.

[4] The term "Scientific Management" was adopted by a group of engineers called in conference late in 1910 by Louis D. Brandeis, then an attorney for the shippers in the Eastern Rate Case hearings, now an Associate Justice of the Supreme Court of the United States.

But the manner in which a mental attitude expresses itself in conduct is hardly less important than the attitude. Although the practices of scientific management may vary according to their adaptation to particular circumstances, nevertheless, if the attitude is definite and consistent, there must be a permanent nucleus of practice which reflects the consistent attitude. Considering both mental attitude and practice, and looking back from 1928 over forty-eight years of its development, scientific management may be restated as involving:

1. The discovery by investigation and experiment of a factual basis for every determination of policy, program, product, material, machine, tool and method in the operations of an enterprise;
2. A system of control of operations, determined by research and experiment, which brings individual specialized efforts into co-ordination with the result of a minimum expenditure of the human and material energies involved;
3. Both research and procedures which, although in design and application chiefly the work of specialists, must be open, reasonable, just, acceptable to all individuals concerned, and expressive of a common purpose and good will.[8]

It is obvious to one experienced in human affairs, and particularly in enterprises in which many types of individuality must join in common effort, that here is not an inflexible system of procedures which can be bought and installed like a boiler or a loom; that on the contrary here is something of an organic nature which, although conceived and guided by an outstanding leadership, grows out of a harmony of desires and understandings within the group. That is one reason why there are so few complete developments of scientific management even though American industry generally has been profoundly influenced by its spirit and has come to utilize many of its mechanisms. In the first place, there are too few managers of vision, leadership and energy who do not require the compulsion of circumstances to undertake the patient development of something new; in the second place, because of natural basic conditions of prosperity, there has not been any general serious urge toward ideals and methods marking a radical departure from opportunism. The urge for a consistent and well rounded development of scientific management, as distinguished from unconscious influence of its spirit and conscious appropriation of some of its waste saving mechanisms, has been felt chiefly by those rare leaders who are capable of response to ideals of perfection in technical accomplishment and in human relations.

Another reason is that the American executive has not taken to doctrines, theories or systems. A doctrine or a system consists of an integrated group of detailed beliefs or practices, many of which may be held or practised by individuals who do not accept or even are not informed concerning the doctrine or the system as a whole. The American industrialist has lived in a period of opportunism, has been concerned chiefly with dynamic problems of frontier industry, and has been engaged in doing things rather than in reading and thinking about things. Doctrines and systems do not excite his interest; in fact, a new doctrine or system is likely at first to invite rejection without serious consideration, although in time it may have great influence if it has integrity and vigor. The planning room, for instance, is now common in American plants, and the concept of high wages and low labor costs now has considerable vogue; yet many do not know that the mechanism came from Taylor, and that in the introduction to "Shop Management" he said: "This book is written mainly with the object of advocating high wages and low labor cost as the foundation of the best management."

Appraisal of the influence of a movement is a matter of historical research, analysis and judgment. One who searches the literature of American management since its beginning will find abundant evidence that the aims, principles and procedures first presented by Taylor have. like the ripples of a stone cast into a pool, spread out into American industry, although many a management of 1928 may not know the source of that which it believes or practises.

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[5] Op. cit. 11, p. 309.

[6] Ibid. I, p. 12.

[7] Ibid. I, p. 11.

[8] For a picture of an outstanding case of scientific management, see the description of Kendall Mills Incorporated, a group of seven cotton textile plants, in *Bulletin of the Taylor Society*, Vol. XII, No. 6, December, 1927.

In addition to such direct and indirect influence of scientific management, it should be noted that its influence has been enlarged and extended by supplementary forces of independent origin. Those who have made research and experiment the basis of the pursuit of their special interest in management—whether in human relations, merchandising or general administration—have found themselves developing techniques and expressing philosophies essentially identical with the technique and philosophy expressed by Taylor nearly half a century ago. Even the very recent developments of psychology in the field of management are more closely related to Taylor's early empirical studies of fatigue in shoveling, handling pig iron and inspecting balls for ball bearings, than to the introspective psychology which was contemporary with Taylor. He had a vision of such things. Asked why he had not turned attention to scientific management in other phases of management than production, he replied that life was too short, that the best he could do was to make a thorough demonstration in the field of production management, leaving to others the problem of carrying the development into other fields.[9]

The phenomena of mechanization and mass production, so characteristic of American industry during the past quarter century, and so economical in the production of large quantities of identical items, should not be confused with scientific management. Scientific management and mass production may coincide, but they are not the same thing. Where they are found together the results are noteworthy; but frequently where mass production and a high degree of mechanization dominate a scene, scientific management is not found. Mass production has its origin in large markets, a huge volume of orders, standardized products, and the possibility of economical fabrication by means of a steady flow of materials through single purpose machines and highly specialized workers; and these factors are not infrequently accompanied by some degree of monopoly advantage. If such is the case — and there are such cases—the enterprise may be highly successful by pursuing lines of least resistance which do not include scientific management.

In contrast to mass production, scientific management had its origin in and is to be found today chiefly in small and medium sized plants making variable items, or standard items variable as to detailed characteristics, on multiple purpose machines which require human regulation and attention as work varies. While mass production makes its gains almost entirely by the economies of a ceaseless flow of material through specialized machines, scientific management makes its gains chiefly by eliminating the wastes of misapplied human effort, misused materials, and lack of co-ordination of efforts where variability is present. Both mass production and scientific management use equipment which is scientifically designed; but scientific management is a management which is itself scientifically designed. Management is necessarily a matter of study and design in plants making variable products in varying volume on variable machines, for in such plants numerous wastes or maladjustments are possible.

In the United States there is great variety as to size[10] of plants, nature of the processing—continuous, intermittent or variable—and as to the kind and quality of management. The numerical proportion of large mass production establishments is small, but the proportion of workers which they

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[9] *Bulletin of the Taylor Society*, Vol. IX, No. 2, April, 1926, p. 55.

[10] The literature of management has so featured interesting cases of mass production that many students in other countries than the United States have received the impression that American industry is made up of "Fords." The following data will be enlightening. Of establishments having an annual product of more than $5000 the distribution in 1925 was as follows (Statistical Abstract of the United States, 1925):

Classes by Value of Product	*Per cent of Establishments*	*Per cent of Workers*	*Per cent of Total Product*
$1000000 and over*	5.6	56.8	67.6
$500000 to $1000000	5.2	13.5	11.0
$100000 to $500000	22.5	20.0	15.3
$20000 to $100000	36.8	7.9	5.2
$5000 to $20000	29.8	1.9	1.0

And from the United States Census of 1919—

Classes by Number of Wage Earners	*Per cent of Establishments*	*Per cent of Workers*
1 to 5 wage earners	56.2	3.3
6 to 20 wage earners	22.2	6.8
21 to 50 wage earners	10.0	8.9
51 to 100 wage earners	4.9	9.6
101 to 250 wage earners	3.9	17.3
251 to 500 wage earners	1.4	13.7
501 to 1000 wage earners	.6	13.2
Over 1000 wage earners*	.4	26.2

*The enterprises which an American would classify as particularly representative of mass production are to be found in the upper strata of those classes identified by an asterisk.

employ and their output is enormous. Some have been strongly influenced by scientific management, some moderately and some very little. There is a very considerable proportion of medium sized plants some of which may have continuous processing in one or more departments, although they would not be classified as mass production establishments. These also have been influenced more or less by scientific management. The dominant proportion of establishments—chiefly, although not altogether, of small size—have managements representing inherited patterns modified by casual imitation. Among all of these classes can be found only a small handful of well-rounded developments of scientific management.

The large class of plants dominated by tradition and imitation has naturally appropriated some of the mechanisms of scientific management, and although the net result has been a gradual raising of the level of management in such plants, this result has not been achieved in all cases. Very serious damage in individual instances to managerial efficiency and harmonious relations with workers, and to the good repute of scientific management, has resulted from failure to adopt ideals and spirit along with mechanisms. It is in this class of plants that the superficial "efficiency engineer" has found his clientele, and as he has not hesitated to seek the advantage of proclaiming himself a representative of scientific management, the harm he has been able to bring temporarily to scientific management has been considerable. But American managements are becoming more discerning, discriminating and cautious, and the baneful influence of the "efficiency engineer" appears to be declining.

The concern of scientific management for harmonious industrial relations, and workers' prosperity and goodwill, has always been deep, for one of the first discoveries of research in management is that goodwill is a productive power independent of the efficiency of equipment and method, a power which adds to that efficiency. But scientific management considers workers' welfare and goodwill, not as something which can be generated effectively as a thing apart from the spirit and methods of management, but as something which is dependent on and a consequence of these. Good management and workers' welfare are the two terms of an equation; it matters little which term is put first.

The lines are many along which scientific management contributes to workers' welfare and goodwill, and to harmonious industrial relations. The entire list enumerated below can be achieved only by a management of superlative vision, understanding and leadership ability, yet the total group of items in the list is true of a particular enterprise which the author has in mind, and other enterprises have achieved a greater or less proportion of these items, according to the capacity for leadership and cooperation present in both the management and the workers in particular instances. Scientific management aims:

1. To gauge industrial tendencies and the market,[11] in order thereby to regularize operations in a manner which will conserve the investment, sustain the enterprise as an employing agency and assure continuous operation and employment.
2. To assure the employe not only continuous operation and employment by a correct gauging of the market, but also to assure by planned and balanced operations a continuous earning opportunity while on the payroll.
3. To earn, through a waste saving management and processing technique, a larger income from a given expenditure of human and material energies, which shall be shared by workers and management. Scientific management plants generally pay wages above the market.
4. To make possible a higher standard of living as a result of increased income to workers.
5. To assure a happier home and social life to workers through removal by increase of income of many of the disagreeable and worrying factors in the total situation.[12]
6. To assure healthful as well as individually and socially agreeable conditions of work.
7. To assure the highest opportunity for individual capacity through scientific methods of work analysis and of selection, training, assignment, transfer and promotion of workers.
8. To assure by training and instructional fore-

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[11] Where there are huge investments of capital in fixed and specialized form this may mean a consideration of social desirability, or long run fundamental usefulness, as bearing on long run demand.

[12] Says one exponent of scientific management concerning his group of seven mills: "While not unmindful of the importance of stability that is coupled with material success, their interest is quite as much in producing better citizens as in securing profits." *Bulletin of the Taylor Society,* Vol. XII, No. 6, December, 1927, p. 525.

manship the opportunity for workers to develop new and higher capacities, and eligibility for promotion to higher positions.

9. To develop self-confidence and self-respect among workers through the opportunity afforded for the understanding of one's own work specifically, and of plans and methods of work generally.

10. To develop self-expression and self-realization among workers through the stimulative influence of an atmosphere of research and valuation, through understanding of plans and methods, and through the freedom of horizontal as well as vertical contacts afforded by functional organization.

11. To eliminate factors of the environment which are irritating and the causes of frictions, and to promote common understandings, tolerances, and the spirit of team work.

These aims—some of them results of early experience with scientific management which have been adopted as the aims of subsequent activity—have not been achieved with equal success in all scientific management plants, and are not the exclusive possession of that small group of plants which may properly be classified as representatives of scientific management. But the literature of scientific management reveals that these have consistently been its aims; most of them from the beginning of the movement, and others as experience has disclosed their importance and practicability. Scientific management has always been characterized as progressive in its concepts of the solution of the problems of industrial relations. Investigation and comparison of plants reveal that generally the more complete the development of a technique of scientific management, the more completely are these aims represented in policy and procedures, and the more favorable the response of workers. The reason for this correlation is not difficult to understand. Scientific management seeks and, the more completely it is developed in a plant, realizes a stability of conditions and a sureness and economy of effort which are impossible without the goodwill and co-operation of the workers. The achievement of the goodwill and co-operation of the workers has consistently been an objective and has never been a problem for scientific management plants.

Entirely distinct from the reactions of workers employed in scientific management plants, and chiefly representing the reactions to scientific management as a theory on the part of organizations of labor not strongly represented in such plants, was the opposition of nationally organized labor for a period of about six or seven years prior to the war. The opposition fortunately has practically disappeared and can be analyzed as are other historic events.

Scientific management came to public attention in the United States through certain hearings before the Interstate Commerce Commission in the winter of 1910-1911. Newspapers and magazines discovered its news value and deluged the public with articles concerning it. And although organized labor had given it no attention during the first thirty years of its slow development, now that the public was becoming interested, labor also became interested. It analyzed scientific management as a doctrine and found grounds for opposition. These grounds were not unreasonable inferences from the inadequate early expositions of scientific management. The reasons for opposition, some declared and some not declared, may be reduced to four:

1. Organized labor had had a long and hard struggle to achieve status in the face of industry's strong opposition, and its natural and not unreasonable assumption was that anything new originating in management and by management was for ownership's advantage and presumably to labor's disadvantage.

2. Assertions concerning the developments of a "science for each operation" and the reduction of operating methods to easily understood instructions, caused a fear of the loss to labor of craft distinctions and of the power of labor in the possession of craft knowledge and skill.

3. Numerous statements concerning economies which had been effected by scientific management, especially in the nature of labor saving, called up at once the instinctive fear that a general adoption of scientific management would cause widespread discharges and unemployment.

4. Inadequate explanations of the use and limitations of time study and of reasons for increase of productivity, led to an assumption that scientific management means a speeding up, wearing out and eventual casting aside of the individual worker.

In view of the atmosphere of distrust between industry and organized labor at that time, these arguments of opposition were not unnatural. They were assumptions and were wrong. The replies to them were based on experience, but an experience not documented, and were unconvincing. There was no solution for the controversy in argumentation, and labor was not disposed to investigate the facts. From the point of view of the historian in 1928, it was necessary for the course of events to bring its own enlightenment through larger experience. That is what has come to pass.

The first ground of opposition disappeared during the war. Employers and leaders of organized labor laid aside their differences as they worked side by side on war committees. They learned to understand each other better as human beings and to value each other's motives. An organized labor observed that the scientific management group was the most consistent of all employing groups in regarding and promoting labor's interests and in the desire to conserve labor's gains after the war.

The second ground of opposition disappeared through gradual observation of the facts. A "science for each operation" does not destroy craft skill; it may modify its content sometimes, but it as frequently gives it wider scope. Labor has observed also that the procedures of scientific management require in addition to old skills, a skill in co-operation through understanding of purpose and methods. A scientific management plant strives to bring all workers in a craft to the level of skill of the best, and is more dependent on uniformly high intelligence and skill within a craft than any other kind of plant.

The third ground of opposition also disappeared through observation of facts. Labor saving through better management, as distinct from labor saving by an occasional epoch-making invention, although easily described, takes research, education and time to achieve. One can tell in one minute about a saving of labor energy which has taken a year or more. Savings are generally by small increments through a long period, and adjustments are effected during the period. The rate of saving rarely amounts to the normal rate of voluntary quits.[13] Scientific management may involve reassignments—and for the first time in the life of many workers assignments on the basis of investigated capacity—but it does not often involve discharge.

The fourth ground of opposition also gradually disappeared with experience. Improvement and standardization of machine conditions and of methods may or may not result in increased speed of production, and with or without increased speed of the operative; it depends upon the particular machine, the particular operation and the particular circumstances. It should be borne in mind that machines and operations vary greatly in the relation of workers' handling time to machine time, and that the problem of speed and of fatigue varies accordingly. In operating a punch press, for instance, the worker is active all the time, fatigue becomes an important element of the situation, and experiment may disclose that a reduction of speed or introduction of rest periods will increase productivity; but in the operation of a large lathe the worker is but a watcher and adjuster for a major portion of his time, and increase in the speed of the machine has only remote fatigue relation to the worker. And in many instances the increase of speed is merely a mathematical result of dividing the total output into the total time taken and securing an average time per piece; for when conditions are improved so as to eliminate waiting and other idle time, speed may be increased mathematically per piece without any increase of actual speed. It has come to be understood that speed and fatigue are problems of each particular operation, and the more carefully a correct speed is sought by experiment and measurement, the more reasonable, just and permanent will be the standard of output agreed upon.

The opposition of leaders of labor to bonafide scientific management has practically disappeared, and during recent years there has been noteworthy co-operation between scientific management leaders and labor leaders. The first striking evidence of labor's interest in good management and increased productivity was the association in 1920 as editors of a volume entitled "Labor Management and Production,"[14] of Samuel Gompers, President of the American Federation of Labor, Morris L. Cooke, an outstanding disciple of Taylor, and Fred J. Miller, President of the American Society of Mechanical Engineers and an exponent of scientific management. A few years later other labor leaders[15] contributed to a similar volume. In December, 1925, William Green, successor to Gompers as President of the American Federation of Labor, participated by a noteworthy address in a meeting of the Taylor Society,[16] and a few months later other representatives of labor participated in another meeting of that society.[17] In the spring of 1927 the General Labor Union of Philadelphia had a two-day conference on co-operation between management and labor in the development of better methods of production, in which scientific management was sympathetically discussed and scientific management engineers and executives were active participants. This led to other similar conferences under the auspices of organized labor. In the Cleveland, Ohio, ladies' garment market organized employers and organized workers have agreed upon a program involving measured standards of output, and the stop watch is the accepted instrument of measurement. On the Baltimore and Ohio, the Canadian Northern and two other railroads there is organized co-operation between management and workers in the development of better methods and the workers have a methods engineer on their payroll.

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[13] The December, 1927 report of the Metropolitan Life Insurance Company, New York, of the average annual voluntary quit rate of more than 300 reporting companies is 14.9 per cent.

[14] *Annals of the American Academy of Political and Social Science*, Vol. XCI, September, 1920.

[15] *Annals of the American Academy of Political and Social Science*, Vol. CXI, January, 1924.

Misunderstandings and disagreements concerning scientific management as a doctrine have given place to co-operative inquiry into conditions and methods of its utilization.

Scientific management had its origin nearly fifty years ago in an inspired effort to solve serious problems of productivity and personal relations in a capitalistic regime of industry already becoming highly mechanized. It has become a philosophy and a body of practices pertaining to management *per se,* independent of any particular regime of industry, and usable in whatever system of industrial society men and women may desire to work together in specialized co-operative efforts toward a common objective. And because it endeavors to base policies, plans and procedures on scientifically determined facts of human nature as well as of mechanics, it is a great force for amelioration of human relations in industry.

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[16] *Bulletin of the Taylor Society,* Vol. X, No. 6, December, 1925.

[17] *Bulletin of the Taylor Society,* Vol. XI, No. 1, February, 1926.

EMPLOYERS in general are feeling out toward a wider conception of their duties and responsibilities. There are few deliberate applications of "Scientific Management" in the sense of a complete application of the Taylor system and methods. Indeed the day for a directly imitative policy is past. Taylor's contribution is beginning to be recognized for what it really is, not a series of devices, but a new philosophy, a fresh attitude of mind, in approaching problems of industrial management of all kinds. The opposition of organized labor to the conception of scientific methods is following the example of the American Federation of Labor, and rapidly changing.

In short, while, with important exceptions, the majority of British employers would confess ignorance of F. W. Taylor's work and deny any intention of applying scientific management in their factories, the undertakings which remain entirely immune from the general effects of his teaching are a rapidly decreasing minority. On all sides there is a growing recognition that the problems of industrial administration can and must be studied on scientific lines. The new knowledge and powers derived from such study may, it is true, be abused, and even directed to anti-social purposes; but properly applied and with adequate safeguards for labor, they must result not only in lower costs and increased productivity, but in higher earnings for the individual worker, a more interesting task, and greater security under an improved standard of life for the community. (Report on Great Britain compiled by Miss S. M. Bevington, B.Sc., from Report of First Triennial Congress of I. R. I. held at Cambridge, England, July, 1928, on the subject of *Fundamental Relationships Between All Sections of the Industrial Community,* pp. 173-174.)

Frederick W. Taylor to Henri Le Chatelier[1]

Correspondence Apropos the Introduction of Scientific Management to France

Courtesy of HENRI LE CHATELIER

IT IS my purpose to make an historic record of the introduction of scientific management to France by the publication of certain letters of Frederick W. Taylor.

I recall how I first made contact with Mr. Taylor. At the Paris exposition in 1900 the Bethlehem Steel Company exhibited a lathe operating with tools made of the new Taylor-White steel. The machine cut enormous chips which immediately showed blue because of the heat generated, and the point of the tool was a dull red. In common with all engineers who visited the exhibit, I was profoundly impressed by the fact that here was something new and significant.

Four years later, in 1904, I founded the *Revue de Métallurgie* with the objective of promoting among French metallurgists a better understanding of scientific methods of work. I proposed to bring to their attention all pertinent information of unusual significance. High-speed steel belonged obviously in this category, and I decided to publish in whole or in part all articles bearing upon the subject. Among others I published a lecture by an English engineer, Mr. Gledhill, in which he attributed the discovery of the Taylor-White method of tempering high-speed steel to a lucky accident.

Very skeptical of the role of accident in human affairs, I disagreed with this explanation in a lecture before the Société d'Encouragement pour l'Industrie Nationale in April, 1904. This lecture was printed in the *Revue de Métallurgie,* Vol. I, p. 334 (1904):

> With respect to to the practical interest in this discovery, one should first call attention to its essential scientific nature. It has often been stated that it was merely the result of accident; that a careless workman had heated a tool of Mushet tungsten steel to too high a temperature, and, contrary to current belief, this abnormal treatment had improved the tool. This refusal to recognize the significance of careful observation and wise utilization of a petty incident is a disregard of the essential nature of scientific method.

This passage some time later came to the attention of Taylor, whose acquaintance I had not yet made, and in 1906 he sent me a word of appreciation; a note which unfortunately I have not preserved, for I did not then realize that it was the beginning of an extensive and cordial correspondence. In it he said that I was absolutely correct in maintaining the position that chance had nothing to do with the discovery of high-speed steel; that in fact it was the result of several years of research by a number of collaborators; that he had not yet published an account of the discovery, but was about to do so in full in a forthcoming presidential address before the American Society of Mechanical Engineers. He said further that this address, of which he would send me a copy, was to be the report of a comprehensive study of the art of cutting metals, of which the story of high-speed steel was only one detail. As soon as I received this study I was impressed by its extraordinary importance, and at once requested of Taylor the permission to translate and publish it in full in the *Revue de Métallurgie,* a permission which he very graciously granted.

In his letter, however, he remarked that in view of my interest in "On the Art of Cutting Metals," he would like to call my attention to an earlier, and in his judgment much more important, study — "Shop Management"—that he would like to have me read it and give him an appraisal, for it had not yet received the attention which it merited.

I present now the letters of Mr. Taylor relative to the translation and publication of his books in France.

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[1] The Taylor Society acknowledges the kindness of Henri Le Chatelier in depositing in the library of the Society letters written to him by Frederick W. Taylor. A part of these letters were published in French translation in Vol. I, No. 3 (September, 1926) of *Bulletin of the International Committee of Scientific Management* (Prague). M. Le Chatelier's introductory statement is reprinted from that Bulletin by permission.

FREDERICK W. TAYLOR
CONSULTING ENGINEER
NEAR
HIGHLAND STATION
CHESTNUT HILL
PHILADELPHIA

September 9, 1907

Mr. H. Le Chatelier,
73 rue Notre Dame des Champs,
Paris, France.

My dear Mr. Le Chatelier:—

Day before yesterday ten copies of the French translation which you have had made of my papers "On the Art of Cutting Metals," "Notes on Belting," and "Shop Management," were received by me. Please let me thank you very warmly for sending these copies, one of which I shall forward to the American Society of Mechanical Engineers, and others to my associates who have been connected with this work.

I want to express to you my great appreciation for the introduction which you have written to the paper. Words of commendation such as those contained in this introduction, coming as they do from engineers of another nationality, afford me, and I am sure also my several colleagues, greater gratification even than if they had been written by Americans. I have not yet had time to read through the entire translation, but so far as I have gone the translation of Mr. L. des Croix impresses me as most accurate; in fact, it appears to me that in many cases the translation is an improvement on the original. I have always felt that the French language was peculiarly adapted to the clear expression of scientific facts.

I regret very much to say that we have, within the last week, discovered one serious error and several minor errors in the work, and I am enclosing you herewith pages which I have cut out from one of the copies which you sent me, giving these corrections. I deeply regret that we did not discover the errors before your translation went to print. The most serious of these errors is that on page 195, in which (32r) should have been written as $(32r)^2$. This error is truly serious, for the reason that it is made in one of our most important and fundamental formulae.

Sincerely yours,
Fred. W. Taylor

Here is a second letter which does not deal with questions of management, but which is interesting because of the opinion Taylor gives on methods of teaching.

January 13, 1908

My dear Mr. Le Chatelier:—

I have just read with great pleasure your lecture upon "L'Enseignement de H. Sainte-Claire-Deville: L'Oeuvre de Moissan," and I thank you very much for your remembrance in sending me the essay. I was very particularly interested in the first few pages of your paper, in which you announce the philosophy of your teaching. While the opinion of a layman such as I am can of course have but little weight, still I trust you will accept my congratulations and the assurance that I am in most hearty accord with the general principles which you announce.

It seems to me of vastly more importance to teach the student first, the broad general principles underlying a science, second, to show him the true scientific methods of investigation (such as were adopted by Moissan), and third, to lead him to use his own brains and initiative in approaching any new subject, rather than to attempt to cram students with a mass of detailed information. As you very wisely say, all of this detailed information later in life would be useful, and much of it may become necessary, but while studying under a man of the calibre of yourself, the most important good which can be derived by a student, to my mind, is the observation of your general methods and the appreciation of your true and genuine enthusiasm for the advancement of science.

I think you are again to be congratulated upon having chosen for your opening discourse a eulogy upon two of your great predecessors. There is nothing more calculated to stimulate both the ambition and earnestness of purpose in the young men than a eulogy such as yours, of two great and successful men like Deville and Moissan.

Please let me also call attention to another fact which, as a foreigner, has been particularly impressed upon me. In reading your essay, I have been impressed throughout with the wonderful simplicity and clearness with which you have written, on what would ordinarily be a rather complicated scientific subject. I am, of course, not very familiar with French scientific writing, and it seems to me therefore that this remarkable clearness and simplicity must be largely due to your own personal ability in the choice of small expressive words, and plain writing. It must be, however, that the French language lends itself in a peculiar way to clearness of expression. Through having been obliged to speak German with my workmen through so many years as a manager in this country, I am much more familiar with German than with French, yet I am absolutely sure that it would be an extremely difficult matter for me to read a German treatise similar to the one written by you. It would have been necessary for me to have used a dictionary over and over again, and in all probability many of the long composite words used in the German writing would have embarrassed me.

Sincerely yours,

Fred. W. Taylor

The letters which follow deal mainly with the publication of the French translation of "The Principles of Scientific Management."[2]

June 22, 1911

My dear Mr. Le Chatelier:—

In answer to your letter of May 23rd, I am exceedingly obliged to you for the interest which you have taken in my book on "The Principles of Scientific Management."

The arrangement which you suggest for publishing it in France, under the auspices of the *Revue de Métallurgie,* would be most satisfactory to me. I fully agree with you that it would be ridiculous to publish a serious work like "The Principles of Scientific Management" in a paper such as . . . .

Your kind offer to write a preface to this book, recommending it to the French readers, is very particularly appreciated. I fully agree with you that it is desirable to put a larger number of sections, chapters or divisions into the book. The American edition was published in so great a hurry that the chapters were not properly introduced and properly headed.

Under a separate cover I am forwarding you one of my photographs. The photographs which you refer to of the two different ways of laying brick, as practised by M. Gilbreth, will also be forwarded to you from my friend Mr. Kent, in New York.

I am also forwarding you, under separate cover, our latest edition of "Shop Management," as published by Harper & Brothers. This book has already been translated by you into French, but you will note an introduction in this book by Mr. Henry R. Towne, one of the Past-Presidents of the American Society of Mechanical Engineers, and also several cuts and plates. I shall of course be very glad to let you have any of the tables, plates or illustrations from this book which you think would be advisable to publish with the other book.

I am also forwarding you, under separate cover, another copy of my book "On the Art of Cutting Metals." It may be that you would like to reproduce some of the cuts of slide rules, etc., from this book.

With renewed appreciation and best wishes, believe me,

Very sincerely yours,

Fred. W. Taylor

December 19, 1911

My dear Mr. Le Chatelier:—

I have just returned from a lecture tour in the western states, and find your very interesting letter of December 2 here, with the proof sheets of part of your introduction to your translation of my paper on "The Principles of Scientific Management."

I expect to read through your preface later in the day. I am very sure in advance, however, that it will be impossible for me in any way to improve upon what you have written. You represent an impartial critic, so that your judgment of the subject must of necessity be better than mine.

Please let me assure you again how very greatly I appreciate your kindness in being willing to write this preface and to take the trouble of having my book translated into French . . .

With renewed thanks and best wishes for a happy and prosperous New Year, believe me,

Very sincerely yours,

Fred. W. Taylor

December 26, 1911

My dear Mr. Le Chatelier:—

I have read through your proof of the preface to the French translation of "The Principles of Scientific Management" with the greatest of interest, and am delighted with your work.

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[2] A few letters on other matters have been added to the list published in the Bulletin of the International Committee.

You have written a most complete essay dealing with those elements which are a constant source of doubt in the mind of the reader. I am very especially pleased with the clear way in which you prove that no harm can come to either the workman or the employer through increase in the output either of the individual or the establishment, and you have dwelt most convincingly upon the all important fact that under scientific management a sudden and very great increase in output cannot be realized, and is therefore not to be feared.

Very sincerely yours,
Fred. W. Taylor

P.S. I am sorry that you have taken the trouble even to send the proof of the translation of the book over to me. I should not presume to make any alterations in your work, so please proceed to printing it just as soon as you are ready to do so, without waiting for any suggestions on my part.

January 2, 1912

My dear Mr. Le Chatelier:—

I wish to leave the matter of style in the printing of the translation of my paper on "The Principles of Scientific Management" entirely in your hands.

It is a matter of comparatively small consequence, and I feel sure that you will be a better judge than I as to what is desirable in this direction.

Very sincerely yours,
Fred. W. Taylor

June 19, 1912

My dear Mr. Le Chatelier:—

I take pleasure in sending you, under separate cover, a copy of our new book on "Concrete Costs."

Don't be alarmed when you receive it, as there will not be the slightest necessity for your reading it through.

My interest in this book has been to give a practical demonstration in the building trades of the value of accurate time study. The information contained in this work about the time required to do all sorts of concrete construction could not possibly have been obtained without the detailed use of the stop watch.

Yours very sincerely,
Fred. W. Taylor

July 17, 1912

My dear Mr. Le Chatelier:—

I mailed you a letter only a few days ago, in answer to your most interesting letter of June 14, in which you speak of your brother's project to send a man to this country to study the principles of scientific management.

I am still further interested in your present letter, in which you speak of a young and energetic manager who is sufficiently interested in scientific management to study it with a view to its more general introduction in France on his return.

It will give me very great pleasure to have such a young man as you speak of come over here, and I shall be glad to pay him the same salary which he is receiving now, or if that is not sufficient, then enough so that he can live comfortably and satisfactorily to himself while he is here. I think that the expense of living in this country will naturally be greater than it is in France. I can assure you that there will be no difficulty on the subject of salary.

The only difficulty which I anticipate is that the man who comes over here may not have a sufficient knowledge of English to be able to mingle with the managers and employes of our various companies, and in this way get the knowledge directly from the managers and working people which can be acquired in no other way.

I want to assure you again personally how greatly I appreciate your kind interest in the subject. I do not know how it is possible for me to repay all of this.

I shall make every effort to obtain another copy of the report of the Committee to Investigate the Taylor and Other Systems of Management, and will send you one as soon as I can get it. So far I have not been able to secure an additional copy.

I do not know whether you fully appreciate the large task which lies before you in even reading the Proceedings of the Committee through. As I remember it, nearly 2,000 pages of testimony were taken.

Very sincerely yours,
Fred. W. Taylor

August 21, 1912

My dear Mr. Le Chatelier:—

A few days ago I had a most agreeable and satisfactory visit from Mr. Marcel Michelin.

I was unable to go with Mr. Michelin to show him various of our companies running under scientific management myself. I arranged, however, to send Mr. H. K. Hathaway, one of the young men in this country who makes it his profession to systematize manufacturing companies, and I am sure he will show Mr. Michelin quite as much as I could.

I was greatly pleased with Mr. Michelin, and glad to hear that his uncle was interested in the principles of scientific management.

Yours very sincerely,

Fred. W. Taylor

September 6, 1912

My dear Mr. Le Chatelier:—

I have just received a letter from Mr. Y. Hoshino, stating that he has translated my work on "The Principles of Scientific Management" into Japanese.

At the same time I sent him my book, I sent him your preface, which you wrote for the French edition, and suggested that he use that preface to the Japanese work, inasmuch as I look upon the writing of your preface as perhaps of even more importance than the main body of the book.

He has just written me that he has adopted the translation of your preface for the Japanese edition. I assume of course that this will meet with your approval.

Yours very sincerely,

Fred. W. Taylor

September 17, 1912

My dear Mr. Le Chatelier:—

In answer to your letter of September 3, Mr. Marcel Michelin left here for France a few days ago. It was very fortunate that my friend Mr. H. K. Hathaway, who is one of the young men engaged in introducing scientific management in this country, was able to give the time to show Mr. Michelin several of our companies working under scientific management.

Under Mr. Hathaway's guidance, I am sure that Mr. Michelin has been able to get a very correct idea of the application of these principles, and also to learn the magnitude of the task, and I hope that he has realized the large financial return which results from the undertaking. I shall be very greatly interested to hear to what decision the Michelin company finally arrive.

It is a disappointment to me to hear that the young engineer whom you had in mind to send over to this country to learn the principles of scientific management, with a view to introducing them in a variety of French manufacturing companies, has entered the employ of the Michelin Company. I should of course be much more interested in training a man who would devote his time to spreading the doctrine at large, throughout the country, rather than devoting himself to one or two companies alone.

However, it will give me pleasure to help any competent man whatever who comes to this country from France, even though he may belong to a single French firm. It is impossible with the best of intentions for anyone to hold these principles secret through a long period of time. They are bound to leak out, and every additional company in France which uses them will be sure to spread our management, in time, into further companies.

It will give me very great pleasure to see Colonel Gage, who you say is about to be sent to America by General About.

In case I am not personally able to go with Colonel Gage, I shall take great pleasure in trying to induce Mr. Hathaway, or some other of my friends, to accompany him as he did Mr. Michelin.

It is a matter of great interest to me to hear that M. Vanzetti, of Milan, is interested in the principles of scientific management. I shall hope to have the pleasure of corresponding with him later.

Please let me thank you again most cordially for your very kind interest and help in this matter.

Very sincerely yours,

Fred. W. Taylor

October 9, 1912

My dear Mr. Le Chatelier:—

Thank you for your interesting letter of September 22, in which you send me a copy of *La Metallurgia Italiana,* containing a translation of your introduction to my paper on "The Principles of Scientific Management." I am very greatly pleased that this is being translated into Italian.

I agree with you that it would be highly desirable for the École Polytechnique to send over an Italian engineer to study the application of our principles in this country.

I am very much pleased to be able to state that the trouble which originally caused the investigation by the congressional committee of scientific management has entirely disappeared, since the workmen of the Watertown Arsenal, after trying our system of management, have become enthusiastic over it, and ceased all opposition.

I am enclosing you herewith a copy of part of a letter received by me a short while ago from Mr. T. G. Roberts, one of our naval officers, who investigated the conditions at the Watertown Arsenal on his own account, and afterwards was good enough to write me this letter. I am also sending you a copy of a letter recently received from Mr. John Q. Tilson, who was the third man selected as judge or umpire on the committee on scientific management. In this letter you will see that Mr. Tilson comments on the causes for writing the committee's report, which was presented to Congress. As he says, this report suited no one, but it accomplished the object for which it was primarily intended, namely, to prevent any legislation being adopted which was adverse to scientific management.

Very sincerely yours,

Fred. W. Taylor

Quotation from a letter of Naval Constructor T. G. Roberts, in regard to his visit to the Watertown Arsenal:

"I stopped over again at Watertown on my way home from Maine and had a very pleasant day with Colonel Wheeler, who told me that the output had been increased by something like 2.6 times what it was before the application of the premium, which he says has been done since the congressional investigation. He also told me that if the investigation were held now instead of then, he believes it would be found that the opposition on the part of the men had practically disappeared, and that all evidences concerning Watertown would be altogether favorable."

Copy of a letter from the Honorable John Q. Tilson in reply to a letter enclosing the above quotation:

New Haven, Conn., September 18, 1912

Dear Mr. Taylor:—

I am in receipt of your letter of the sixteenth instant and I am very glad to learn of the change of sentiment at the Watertown Arsenal. I feel confident that when your system is thoroughly understood workmen themselves will rise up and demand it. The feeling against it among the walking delegates and labor representatives in power at Washington is certainly very strong. Mr. Redfield was of the opinion that if we made a report in anywise favorable to the immediate adoption of scientific management in government establishments that a stringent law would be passed forbidding it. He thought the time was not yet ripe for such action and proposed a compromise report, which we made. I doubt, however, if our report was entirely satisfactory to anybody, not even ourselves. It would undoubtedly stave off extreme legislation on the subject, however.

Very sincerely yours,

John Q. Tilson

October 22, 1912

My dear Mr. Le Chatelier:—

Your letter of October 10 has just been received here, enclosing a letter written to you by the Director of the Institut du Mois Scientifique et Industriel, together with your reply to him.

I have not the slightest doubt that your judgment is correct in this matter, and I thank you very much for the trouble that you take in handling all the correspondence relating to the publication of the book.

I have just received a letter from a young man in Paris, Henri Simson, who asks to translate "The Principles of Scientific Management" into Lettish, and it seems to me that anyone who is willing to do a work of this sort for so small a country ought to have the privilege of doing so.

Yours sincerely,

Fred. W. Taylor

Villa Margherita,
Charleston, S. C., February 26, 1913

My dear Mr. Le Chatelier:—

Your kind letter of February 12 has been forwarded to me here. I am very much pleased to see from your letter and from those which you have sent me that "The Principles of Scientific Management" are likely to be translated into Italian. I should gather from reading the letters that Dr. Francesco Giannini is a reliable man to undertake the translation. I still recall your very great kindness in preventing the translation from falling into improper hands in one of your French magazines lately.

I have written Mr. Giannini a letter as per enclosed copy. . . .

Very sincerely yours,

Fred. W. Taylor

February 26, 1913

Dear Mr. Giannini:—

My friend, Mr. Henri Le Chatelier of Paris, has just forwarded to me a letter written by you in February of this year asking for permission to translate "The Principles of Scientific Management" into Italian. I can assure you that I feel greatly honored to hear that you think the book of sufficient interest to translate it. I am only too glad to have it translated into any language where there is a likelihood of its being read. I have never had any intention of making any money out of this work, and the only request that I wish to make is that in translating it the spirit of the book will not be altered. I speak of this because in one instance a man who translated it into a foreign language attempted to correct several of the principles and important features of the book so as to make them suit his ideas, with the result that the book as translated by him represents only about one half of my ideas. You will readily see that this is hardly fair to an author, but I feel sure that this is would be no such happening in your case.

I of course have no authority to authorize you to translate the wonderful preface which was written by Mr. Le Chatelier to the French edition of "The Principles of Scientific Management." Mr. Le Chatelier's preface is a fine treatise in itself, and it has certainly added very greatly to the value of the French book. I would suggest your writing to Mr. Le Chatelier for permission to use his preface, as it is by far the finest introduction which has been written to my book.

I am pleased to say that Y. Hoshino, who has translated my book into Japanese, also used Mr. Le Chatelier's preface for the Japanese edition.

I am very sorry that I did not know of your interest in this book last year. I was in Rome during the month of March, 1912 and was quite interested in studying the movements of your Italian mechanics and workmen. The result of my studies led me to call on your Mayor, Mr. Nathan, with a view to interest him in the subject of scientific management. I was especially desirous of getting some Italian engineer who was a successful manager of some industrial establishment and have him come to America so that I could teach him all of the details which have been gradually elaborated in connection with scientific management, and then have him return to Italy properly equipped to introduce our system. It is very difficult, however, to obtain a man of this sort, because it is desirable in addition to being a good manager of workmen that he should have worked in a machine shop himself, and also be able to speak English quite readily, because without these qualifications he would find it extremely hard to learn anything in this country.

I am sending you under separate cover a copy of each of my books, "The Principles of Scientific Management" and "Shop Management." The latter book is very much more used by practical engineers than "The Principles of Scientific Management," although it is not as interesting to the general reader.

Will you be kind enough to let me know as to what progress you make with the translation, and oblige

Yours very truly,

Fred. W. Taylor

November 10, 1913

My dear Mr. Le Chatelier:—

Answering yours of October 26, I am very much interested in what you write me about . . . . . . He seems to have had a training which would tend to qualify him to successfully introduce our system of management. I am particularly interested in the fact that he has had a number of workmen under him, and has actually successfully managed them. The number seems rather small, however, as a complete test of one's ability as a manager.

We are more and more arriving at the conclusion that the man who has even the finest kind of theoretical education, that is, the trained engineer or scientist, but who has not had actual experience in managing men, and who has not proved by experience that he is capable of managing men, generally does not succeed in learning how to introduce scientific management. In other words, by far the most important part of the engineer's qualifications is that of having *successfully managed workmen.* After he has shown that he possesses this faculty, then the more education the better; but I think I may say that almost every man whom I have tried to educate to introduce scientific management and who has not had the actual experience of being a successful manager of workmen, has failed to succeed in introducing our system of management.

Does Mr. . . . . . speak English well? You realize that none of our foremen, workmen, or superintendents, practically, speaks French, so that he would learn next to nothing of our system if he does not speak English well.

If he comes over here, also, he should clearly understand that it will be necessary for him to actually work as a workman, with his hands, for a long time. We have definitely concluded that we shall not attempt to train any other men in scientific management who will not go through this part of our course. Nine out of ten men, while they are working in this way in our shop, as a preparation to learning scientific management, firmly believe that they are wasting their time. On the other hand, it is our observation that this actual work is in all cases an absolute necessity for success.

To summarize: if Mr. . . . . . feels that he has a special *aptitude for managing men,* and understands the nature of workmen, and finds this a congenial occupation, and if he speaks English, then we should be very glad to have him come over here and to train him; and I should be ready to give him what financial assistance is necessary.

Yours very sincerely,
Fred. W. Taylor

April 29, 1913

My dear Mr. Le Chatelier:—

I have never seen the paper or the book, written by Mr. Frazier, whose brutal statement was printed in the French papers as having to do with our system of management. Our system of management has never been introduced in any Pittsburgh company, and Mr. Frazier states that he was talking to the manager of one of the steel works in Pittsburgh. Therefore this could not have applied to our company. However, it would be utterly impossible that any such remark could apply to any of our companies, because the very first and most important object of our system of management is to look after the welfare of our men, to make all of the workmen in the place our genuine friends; and every independent investigator who has looked into the condition of the men in our various companies has arrived at the same conclusion, namely, that our workmen are truly the friends of their employers, and of the managers who are over them.

It is perfectly evident that this would be utterly impossible if it were the policy of those under scientific management to work them so hard as to injure their health. Our companies are open at all times to visitors, and I have over and over again offered to pay a large sum of money to anyone who would find a single man in any of our companies who was overworked. This offer holds good now.

In answer to your question as to what book has been published in this country which contains a time study of a trade, I would refer you to "Concrete Costs," by Taylor and Thompson, a copy of which book I have already sent you. By looking through this book you will find thousands of items of time study. Mr. Thompson and I were some five or six years in collecting the data, in writing this book, and in verifying the various time items by actually figuring up the time which the book says it ought to take to do a piece of work, and then timing the work itself.

We have the data collected for a similar book on earth work, and also for carpentry, bricklaying, roofing, masonry, lathing and plastering; but it takes far more time to properly describe the use of the time study and to verify all of our data (by actually checking it up against work which is performed under average conditions); so that it will be some years before these books are published.

We also have a very elaborate time study[3] made for machine shop work, but have not had the time as yet to publish this data. Some time ago I sent you our book entitled "Concrete, Plain and Reinforced." This is a much more elaborate looking book than the one on "Concrete Costs," and yet it does not involve one-half the labor to write it taken in the latter . . . . .

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[3] The results of these studies were published after Mr. Taylor's death in *"Time Study for Rate Setting"* by Dwight V. Merrick, New York, The Engineering Magazine Company, 1921.

I am of course very much interested and pleased to hear that you propose to reprint the book on "Shop Management." This, for practical men, is much the more important of the two books.

I most sincerely hope that your Minister of Marine, Mr. Bodin, will introduce our methods into the French navy yards. He is entirely right in stating that it is unjust to the State that it should not share in the gain which is made, and I am sure that Mr. Bodin would find the French workmen entirely ready to share the gain made under our system with the State. This has proved true in all cases in this country.

You are already leading us in France in having established a laboratory in the Conservatoire des Arts et Métiers for studying human effort. Your scientific methods are so magnificent in France that I confidently expect that in many ways the French people will lead us in the introduction of the principles of scientific management, before many years.

I cannot reiterate too often the great appreciation which I have for the work which you are doing for scientific management in France.

Very sincerely yours,

Fred. W. Taylor

P.S. I am having sent to you, from the publisher, a copy of a book called "Making Both Ends Meet," by Miss Sue Ainslie Clark and Miss Edith Wyatt, giving the results of Miss Wyatt's investigation in several of our companies employing scientific management, in which women were working. I may say that Miss Wyatt, when she first started this investigation, was bitterly opposed to the principles of scientific management. She believed that it would result in great injury to the working girls; but the outcome of her investigation, as you will see by reading the last chapters of the book, was just the opposite. She found scientific management a very great benefit to the working people. I am sending you this in view of the statement made in the French papers that our system of management is injurious to the workman.

I have also asked the Secretary of the Society for the Promotion of Engineering Education, at Ithaca, New York, to send you a copy of the "Symposium on Scientific Management and Efficiency in College Administration," comprising among others, papers presented at the Efficiency Session of the Twentieth Annual Convention of the Society.

November 13, 1913

My dear Mr. Le Chatelier:—

I have just received an advertisement of the second edition of "Principles d'Organisation Scientifique des Usines," which was published by H. Dunod et E. Pinat, and which is now being sold at two francs per copy.

I am delighted that the work is placed before the public at so low a price, and want to again thank you for the wonderful interest which you are taking in this matter.

Very sincerely yours,

Fred. W. Taylor

MODERN industry is extraordinarily complicated and will become increasingly more so. Every article is composed of a great number of separate pieces . . . . In the end this complication gives a more economical result, but only on condition that all the services combining to a common end are perfectly co-ordinated, that each one does his task at the right time. This is so essential now that there is no modern enterprise where this co-ordination is not the object of the constant attention of its directing head. This is what they call his administrative function. Taylor has not invented co-ordination but he has made a study of it, as he has all of the factors of production, with extreme care, always applying the maxim: "Reflect before you act." (Henri Le Chatelier, *Philosophy of Taylorism* to be printed in a future issue of the *Bulletin of the Taylor Society.*

Vehicular Accident Prevention[1]

A Study Conducted in the Delivery Department of R. H. Macy & Co., Inc.

By J. E. OGARA
Superintendent of Delivery, R. H. Macy & Co., Inc., New York

THIS paper might better be called "The Evolution of an Accident Campaign"—for that is the story I shall tell. In order to describe the process properly it is necessary to have a setting, or status quo, into which on November 10, 1926 was introduced the intensive accident campaign known to all by the earmarks of drivers' meetings, car cards, blackboards and bonuses.

During the years immediately leading up to the accident campaign era in the life of the metropolitan stores, R. H. Macy & Co., Inc., piled up, I believe, more than its share of vehicular accidents, caused without doubt by careless manipulation of vehicles by drivers. The usual things were "done about it." If a driver had too many accidents he was fired; those in the process of being fired were thundered at. Perhaps the driver caught more hell for accidents than he did for other inattentions to duty; perhaps he did not. At any rate, the corrections were admittedly few and haphazard at best. Instead of making progress we seemed to be slipping and our insurance premiums increased each year. On November 10, 1926 we entered the lists as the first store to employ a nationally known safety engineer, undertaking an intensive drive to improve our condition. This drive was not confined to the delivery department alone. It embraced the whole store and without doubt was responsible for materially reducing the number of preventable accidents. We shall here confine ourselves, however, to the campaign with the store's drivers.

A word about the drivers is in line, however, before beginning. Employment statistics show that our store compared favorably with other stores in turnover and in the age of drivers. We consider these two factors important because it is well known that the promotion of safety depends in some measure on the driver's feeling of security in his job and on his sense of responsibility. It is generally agreed that the latter quality is not universally possessed by youth. In incentives on the job we also compared favorably—or, it might be said, poorly—with the other stores. The starting wage for a driver was $27.00 a week. At the end of six months' service he was given an increase of one dollar a week and a similar increase for every successive year that he worked thereafter, up to a maximum of $38.00 a week, regardless of his performance on the job. This so-called automatic salary advance plan is important in this connection and, incidentally, its use in the department store delivery field is almost universal. Modifications, if they exist, lie only in the amounts paid in other organizations.

With the above as a background it is possible to proceed with the story of the campaign. The safety engineer brought to us safety technique which can be summarized as follows:

1. Weekly meetings with drivers.
2. Bonus payments to each driver of $5.00 for every twenty-five consecutive days of driving without an accident.
3. Large blackboard displays in each delivery station—a message designed to remind the driver of the need for safety. Some of these messages were ingenious and attractive. We also employed red and green blinking lights at each end of the blackboard in the store delivery stations.
4. Small cards carrying a reminder of safe driving attached to the dashboard of each car. Different colored cards and printing inks were used. One reminder car card reads, "Drive as you would if the pedestrian near your car were your mother."

At meetings of the drivers the safety engineer and the delivery superintendent described to them the necessity for safe driving and pointed out in an easily understood fashion the underlying principles. After a short period of trial it was decided to hold meetings only every other month instead of weekly. The meetings were held in the morning when most drivers' loads were out of their bins. We felt that consideration of the risk of stolen packages when loads were left unprotected would take the driver's attention and therefore destroy the main purpose of these meetings. Part of the purpose was to *interest* the driver in safe driving. If he were made to listen when he felt strongly the possibilities of his financial loss it was felt that the meetings would prove a deterrent rather than an incentive to safe driving. In New York City, and particularly in a delivery the size of ours, we cannot be unmindful of the factor of honesty.

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[1] Printed by permission of the National Retail Dry Goods Association before whose February, 1928, convention this paper was presented. The paper was also published in their *Bulletin* for April, 1928.

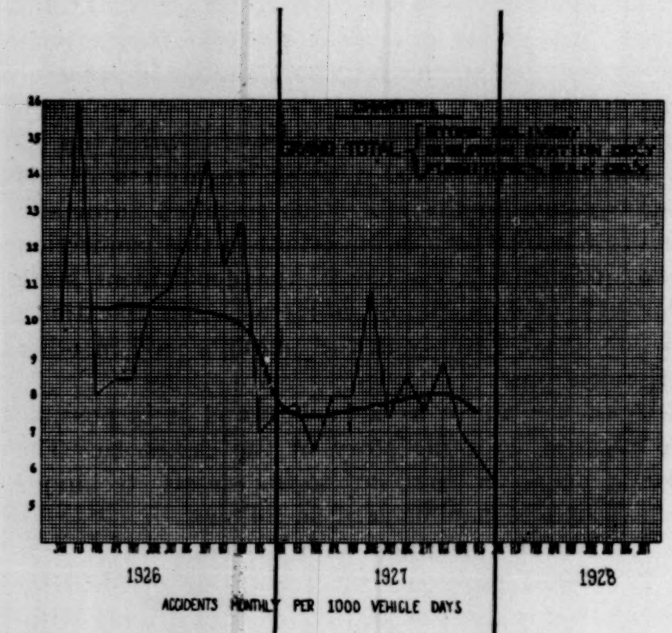

Figure 1

The campaign that I have described was carried on faithfully from November 10, 1926 to October 1, 1927—a period of over ten months, and long enough to measure its efficacy, in part at least. Now let us see what was accomplished toward the reduction of vehicular accidents during this period.

Figure 1 plots the curve of the total number of accidents per one thousand vehicle days by months from January, 1926 to January, 1928. This chart represents the use of an average of two hundred and twenty vehicles per day under all the conditions faced in New York. Roughly forty-five per cent of these vehicles were one, and one and one-quarter ton gas and electric vehicles, carrying combination loads in city territory. Thirty-five per cent were one and one-quarter ton gas vehicles carrying combination loads in suburban territory, and twenty per cent were two, and two and one-half ton gas vehicles carrying furniture and bulk merchandise throughout both city and suburban territory. The chart shows that the result of the campaign which began in November, 1926, was to reduce the number of accidents per one thousand vehicle days from the high average of 11.5 to seven. In all fairness it should be pointed out that during the year following the introduction of the campaign the chart shows that accidents were reduced from 11.5 for one thousand vehicle days to eight. The curve shows a slight rise during the last months of the campaign and then at its close, near October 1, 1927, the curve falls away to new and unprecedented low figures. It should be borne in mind

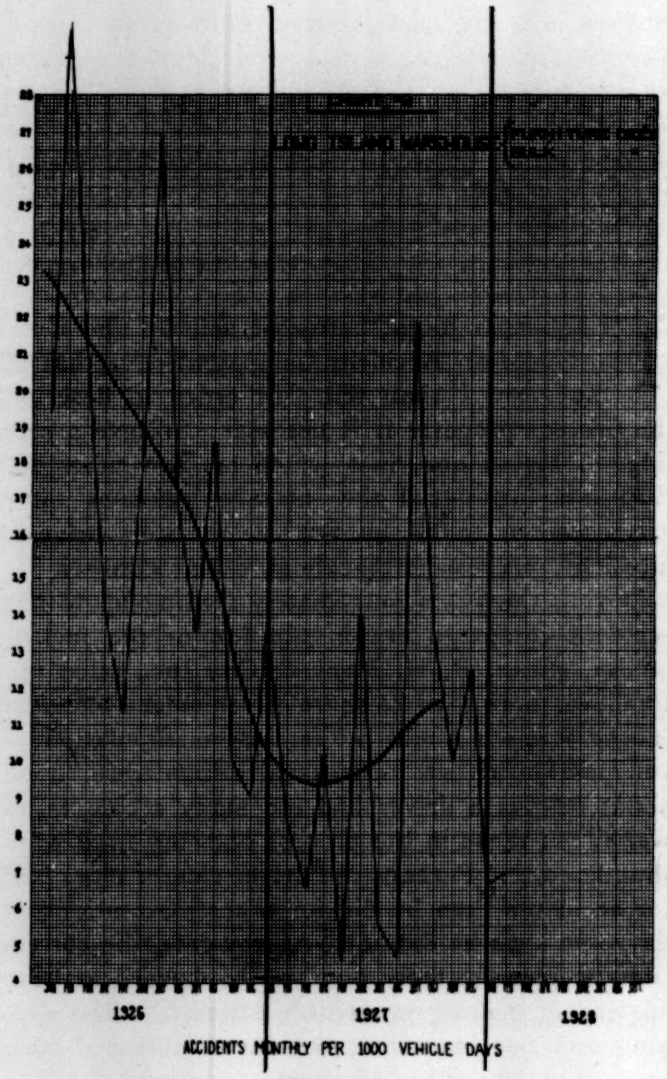

Figure 2

that these are the months of peak business in a department store.

I have said that the campaign closed; I should have said that it took on a new form. The campaign technique described above was for the most part dropped and our present accident prevention program was evolved from it. Before proceeding with a description of this technique, however, let us turn for a moment to a consideration of the other charts which show subdivisions of the total experience pictured in Figure 1.

Figure 3 (store delivery experience) is especially interesting. Through the facts brought out in this chart alone we learned one entirely new approach to accident prevention work. You will note the effect of the opening of the accident prevention campaign in November, 1926. Results were immediate and continued for several months. An average line drawn through the original curve is significant in that it brings out the fact that the two high levels in the two years correspond roughly as to period. This is at the time when *helpers* are driving, replacing the older and more experienced drivers during the spring increase in business and during the summer vacations. This was the reason for our establishing our motor school, more properly called the driving school. It was started in January of this year to *teach safe driving* to new drivers, helpers promoted temporarily or permanently to positions as drivers and drivers who have bad accident records. Further reference will be made to the school at another place in the paper. Referring again to this chart and following the average line through the course of the two years plotted, we can hardly claim that the campaign placed us in an enviable position, at least in this one subdivision of delivery. It should be said in this connection that it was here that we did our hardest work. May I call your attention before you leave this chart to the curve as it is plotted from the close of the campaign to February, 1928. November, 1927 marks the beginning of a downward curve to an unprecedented low level in February.

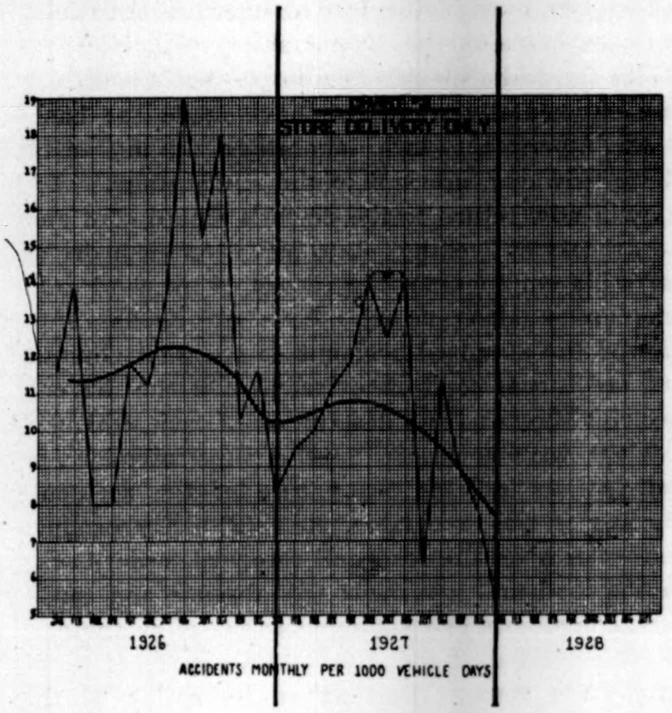

Figure 3

*Helpers driving. June vacations and increase.

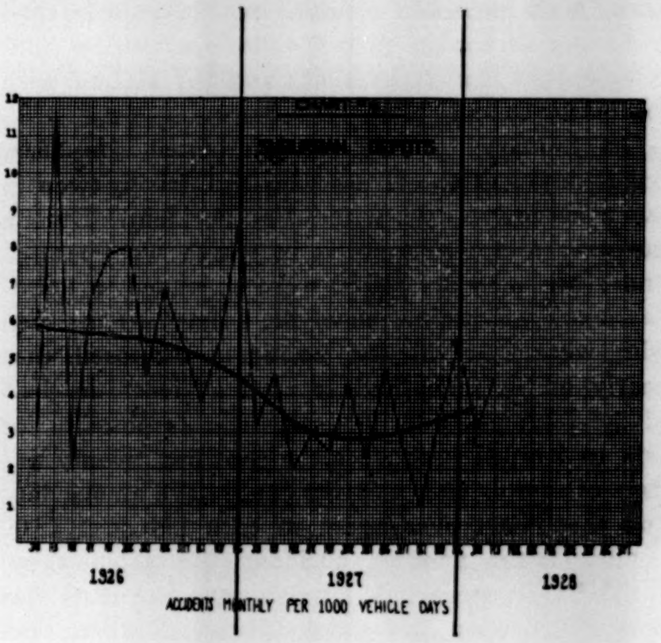

Figure 4

The furniture delivery experience (Figure 2) shows the campaign producing a steady downward curve which, however, started to rise again in September, 1927 during the peak period of the August furniture sale. Here again we see the effects of using inexperienced helper drivers.

The suburban experience is easily followed by consulting the average curve in Figure 4. Here the sharp rise in the accident ratio following the opening of the campaign is not particularly significant because of the fact that a smaller number of reported accidents necessarily results in more marked changes in ratio. This rise is undoubtedly a "flash in the pan." It is apparent that the campaign did produce results. The high point of December, 1927 was due entirely to a series of helper driver accidents in one suburban station. Suburban accidents form a small percentage of the grand total and this accounts for the slight rise in the curve during the fall and winter of 1927 and 1928.

There is evidence in these charts of the workings of a more powerful influence than that of the standard accident campaign. This influence is the driver's interest, aroused by "selling" his record card to him and basing his compensation upon its story. Before proceeding with this point, however, let us turn back and examine two lessons learned from the campaign proper—the first lesson concerned with bonus payments and the second with the motor school.

On January 1, 1928 we eliminated the $5.00 bonus payment to drivers who had driven twenty-five consecutive days without an accident. During the year and two months in which we operated under this plan $11,200.00 were expended in bonus payments. Examination of the records of the men who were laid off for accidents disclosed that nearly all of them had secured at least one-half of the total possible bonuses. It was possible for this to happen because after the first twenty-five days of safe driving a driver could have an accident and then start over again to earn his next $5.00 bonus. After another accident the same thing could be repeated indefinitely, until the man was laid off. Under this plan we wasted about one-half of the $11,200.00. We also felt that the financial appeal would be greater if an equal amount of money was expended in substantial salary increases to men for *well demonstrated* ability only—for month after month safe driving records. Our new drivers' salary plan, inaugurated May 1, 1927 and finally put across during the fall of the same year, accomplished the result we had in mind.

As I have pointed out before, the motor school was a result of the findings presented in Figure 3, which shows high accident levels during the period in which helper drivers are used. Through the reading of hundreds of accident reports during these two years several significant theories were evolved. They are:

1. It is possible that the driver helper does not know what to do under different driving situations. Perhaps his driving education was like Topsy's.

2. Perhaps he knows what to do but not *why*. Here it may be said that it has long been known that the *why* of a rule is just as important in teaching its observance as the *how*.

3. Perhaps the driver helper or driver is not fit to drive—mentally incapable of reacting quickly enough.

We have therefore set about to show the men *why* they must approach intersections with the car running slowly and under perfect control; why a certain speed at a certain distance behind another vehicle is too fast. In showing the drivers why and how an instructor takes them out on the street and makes them drive into dangerous situations while he explains the proper safety principles.

The third theory raised above—that the driver may be mentally unfit—we have made the basis of an experiment with laboratory driving tests. These, however, are still in the study stage.

I will now return to the driver's record card and the process of "selling" it to him. As each driver starts his employment the record of his work and behavior is also started. This device has supplanted the standard accident campaign technique and far surpasses it in efficacy. On the driver's record is shown: (1) a description of each vehicular accident with comment by the Superintendent of Delivery to indicate the nature of the accident, whether it was avoidable, etc.; (2) daily production—pieces on the load and returned, order-backs on the load and returned; (3) absence and tardiness, complaints and commendations of customers; (4) the opinion of his supervisors expressed quarterly on a rating sheet as an indication of the driver's attitude and disposition and (5) damaged merchandise charged to his load, his cash shortages and a record of his failure to deliver paid merchandise.

The records are carefully reviewed each quarter by a committee composed of two Assistant General Managers, the Superintendent of Delivery, the Assistant Superintendent of Delivery and the Superintendent of Training. Each factor in the driver's record is examined and weighed and recommendations for advancement are made on the basis of these studies.

If a driver cannot be advanced because of his record he is told why advancement is not possible. Vehicular accidents are given the most weight. No driver who is guilty of an accident which is considered avoidable by the Superintendent of Delivery can receive an increase in salary until at least eight months have elapsed, during which time the driver's record is entirely free of any kind of accident.

This plan has been explained many times in printed matter presented to the men and also through personal interviews with the Delivery Supervisors. After showing the driver how, we tell him why; then we show him what other drivers are doing and demand that he do as well to make a good job for himself—good in that it is secure and well paid. We hope that this program will not only eliminate many unfortunate injuries from accidents, but also that it will give us management economies along with high salaries for good work.

This paper should not close without a word to the careless imitator. As this plan has in it great possibilities of benefit it also has in it great possibilities of danger. In the hands of a careful, intelligent and strictly just management which has well defined personnel policies our plan should pay dividends within two or three years. If it is carelessly handled, however, it will just as surely result in discontent and injury to the individual and to the community.

News of the Sections

The Central New York and New York Metropolitan Sections have resumed their regular meetings.

The Central New York Section joined with the National Association of Cost Accountants at Syracuse on September 18 in a meeting on "Organizing Business for Profit." Mr. J. P. Jordan, of Stevenson, Harrison and Jordan, was the speaker.

On October 18 the New York Metropolitan Section will hear Mr. O. W. Knauth, Executive Vice-President and Merchandise Counselor of R. H. Macy & Co., Inc., on "Hand to Mouth Buying; Its Influence on Retail Merchandising Management." This is the first of a series of meetings on the effects of hand to mouth buying on management problems in various types of enterprise.

Communications

August 28, 1928

The Editor of the Bulletin:
Dear Sir:

Your issue of February last contained a review by Mr. Joseph H. Barber of my book, "Business Forecasting and Its Practical Application."

All an author can ask in such matters is that the reviewer should be fair, and Mr. Barber was friendly. I do not therefore ask to enter into any discussion from my point of view as an author. There is, however, one criticism of the book which does appear to me to raise a matter of general interest to your readers; that is, the objection to my two statements: (1) that we in Great Britain do not yet fully know where we stand in the post-war trade cycle and (2) that the orthodox forecasting theories should not be counted upon to work automatically in abnormal periods.

To these two statements I firmly adhere. Indeed I am inclined to submit that at the present time you in the United States do not really know where you stand in the trade cycle; that your present conditions are abnormal, and that for these reasons you have no definite and authoritative guidance as to the probable course of general trade over the next year or two. I hope I may be wrong in this, but it is an opinion not lightly arrived at and I throw it out as a matter meriting your consideration.

In the United States the "speculative" indices have risen to unprecedented heights, and now money rates are rapidly rising and have already reached the highest point since 1921. According to your most influential school, this would normally presage an early and severe slump in business. Do you expect it? I find no hint of such expectation in the views of any of the chief forecasting agencies summarized in the monthly circular of the American Management Association. I take it that the answer would be that while speculative and money conditions are suggestive of boom, industry and commerce are in fact in a conservative position, and that no slump need be expected. Accepting this view to be correct for the sake of argument, is it not just another way of saying that present conditions are abnormal, and orthodox forecasting theories therefore cannot be automatically applied? In Great Britain the "speculative" indices have for a long time shown steady and substantial rise, accompanied by comparatively low money rates, and this would normally point to fairly rapid improvement from our trade depression. It would, however, be a very bold Briton who would take this view today. On the contrary, unemployment (which I have found to be our best single index of prosperity) has steadily increased (leaving seasonal variations out of account) for nearly a year and is still increasing. Either some of the theories break down or the conditions are abnormal. I could draw similar lessons from Germany, France and Italy. I could suggest, too, in what respects conditions are abnormal in the different cases, and why; but space does not permit, nor is it necessary to my purpose. I cite these things in support only of the view that, until at any rate the tidal wave of war has subsided and disclosed the old landmarks or proved their removal, it is as foolish on the one hand to rely upon any cut and dried system of business forecasting as it is on the other to ignore forecasting altogether. Willy-nilly, we must rely upon our own considered